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FINAL REPORT

ECONOMIC ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE SAN BERNARDINO CARBONATE PLANTS

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BLM	Bureau of Land Management
CCPM	California Cement Promotion Council
CDCA	California Desert Conservation Act
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CH	Critical Habitat
CHD	Critical Habitat Designation
CHMS	Carbonate Habitat Management Strategy
CMT	Cushenbury Mine Trust
DMP	Dust Management Plan
EIR	Environmental Impact Report
FIRE	Finance, Insurance, and Real Estate
GCC	Ground Calcium Carbonate
HCP	Habitat Conservation Plan
NEPA	National Environmental Policy Act
PCE	Primary Constituent Element
PCC	Precipitated Calcium Carbonate
PoO	Plan of Operation
SBNF	San Bernardino National Forest
SBREFA	Small Business Regulatory Enforcement Fairness Act
SCAG	Southern California Association of Governments
SMARA	Surface Mining and Reclamation Act
SMI	Specialty Minerals, Inc.
SUP	Special Use Permit
TCPU	Transportation, Communication, and Public Utilities
UTM	Universal Transverse Mercatur

PREFACE

The U.S. Fish and Wildlife Service (Service) has added this preface to all economic analyses of critical habitat designations:

"The standard best practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without the regulation. Guidelines on economic analysis, developed in accordance with the recommendations set forth in Executive Order 12866 ("Regulatory Planning and Review"), for both the Office of Management and Budget and the Department of the Interior, note the appropriateness of the approach:

> *'The baseline is the state of the world that would exist without the proposed action. All costs and benefits that are included in the analysis should be incremental with respect to this baseline.'*

"When viewed in this way the economic impacts of critical habitat designation involve evaluating the 'without critical habitat' baseline versus the 'with critical habitat' scenario. Impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline and the scenario in which critical habitat is designated may include (but are not limited to) changes in land use, environmental quality, property values, or time and effort expended on consultations and other activities by federal landowners, federal action agencies, and in some instances, State and local governments and/or private third parties. Incremental changes may be either positive (benefits) or negative (costs).

"In *New Mexico Cattle Growers Association* v. *U.S.F.W.S.,* 248 F.3d 1277 (10th Cir. 2001), however, the 10th Circuit Court of Appeals recently held that the baseline approach to the economic analysis of critical habitat designations that was used by the Service for the southwestern willow flycatcher designation was 'not in accord with the language or intent of the ESA.' In particular, the court was concerned that the Service had failed to analyze any economic impact that would result from the designation, because it took the position in the economic analysis that there was no economic impact from critical habitat that was incremental to, rather than merely co-extensive with, the economic impact of listing the species. The Service had therefore assigned all of the possible impacts of designation to the listing of the species, without acknowledging any uncertainty in this conclusion or considering such potential impacts as transaction costs, reinitiations, or indirect costs. The court rejected the baseline approach incorporated in that designation, concluding that, by obviating the need to perform any analysis of economic impacts, such an approach rendered the economic analysis requirement meaningless: 'The statutory language is plain in requiring some kind of consideration of economic impact in the CHD phase.'

"In this analysis, the Service addresses the 10th Circuit's concern that we give meaning to the ESA's requirement of considering the economic impacts of designation by acknowledging the uncertainty of assigning certain post-designation economic impacts (particularly section 7 consultations) as having resulted from either the listing or the designation. The Service believes that for many species the designation of critical habitat has a relatively small economic impact, particularly in areas where consultations have been ongoing with respect to the species. This is because the majority of the consultations and associated project

modifications, if any, already consider habitat impacts and as a result, the process is not likely to change due to the designation of critical habitat. Nevertheless, we recognize that the nationwide history of consultations on critical habitat is not broad, and, in any particular case, there may be considerable uncertainty whether an impact is due to the critical habitat designation or the listing alone. We also understand that the public wants to know more about the kinds of costs consultations impose and frequently believe that designation could require additional project modifications.

"Therefore, this analysis incorporates two baselines. One addresses the impacts of critical habitat designation that may be 'attributable co-extensively' to the listing of the species. Because of the potential uncertainty about the benefits and economic costs resulting from critical habitat designations, we believe it is reasonable to estimate the upper bounds of the cost of project modifications based on the benefits and economic costs of project modifications that would be required due to consultation under the jeopardy standard. It is important to note that the inclusion of impacts attributable co-extensively to the listing does not convert the economic analysis into a tool to be considered in the context of a listing decision. As the court reaffirmed in the southwestern willow flycatcher decision, 'the ESA clearly bars economic considerations from having a seat at the table when the listing determination is being made.'

"The other baseline, the lower boundary baseline, will be a more traditional rulemaking baseline. It will attempt to provide the Service's best analysis of which of the effects of future consultations actually result from the regulatory action under review - i.e. the critical habitat designation. These costs will, in most cases be the costs of additional consultations, reinitiated consultations, and additional project modifications that would not have been required under the jeopardy standard alone as well as costs resulting from uncertainty and perceptional impacts on markets."

DATED: March 20, 2002

EXECUTIVE SUMMARY AND REPORT ORGANIZATION

The purpose of this report is to identify and analyze the potential economic impacts that may result from the proposed critical habitat designation for five plant species endemic to carbonate soils in the San Bernardino Mountains of southern California. This report has been prepared by Economic & Planning Systems, Incorporated, under subcontract to Industrial Economics, Incorporated, for the U.S. Fish and Wildlife Service's Division of Economics.

Section 4(b)(2) of the Endangered Species Act (Act) requires the Service to designate critical habitat on the basis of the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

The focus of this economic analysis is on section 7 of the Act, which requires Federal agencies to insure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. Federal agencies are required to consult with the Service whenever they propose an action that may affect a listed species or its designated critical habitat. Aside from the protection that is provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 only applies to activities that are carried out, permitted, or funded by a Federal agency, the designation of critical habitat will not afford any additional protections for species with respect to strictly private activities.

CRITICAL HABITAT DESIGNATION

On February 12, 2002, the Service proposed designating critical habitat for five plant species on approximately 13,180 acres of land in San Bernardino County, California. The project area and proposed critical habitat boundaries are shown in **Figure 1** and **Figure 2**, respectively. These five plant species -- the Cushenbury milk-vetch (*Astralagus albens*), the Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*), the San Bernardino Mountains bladderpod (*Lesquerella kingii* spp. *bernardina*), the Cushenbury oxytheca (*Oxytheca parishii* var. *goodmaniana*), and the Parish's daisy (*Erigeron parishii*) -- (hereafter the "carbonate plants") are found on carbonate substrates and their derived soils within a 35-mile swath along the San Bernardino Mountains.

Figure 1
Proposed Critical Habitat Areas in Southern California Context

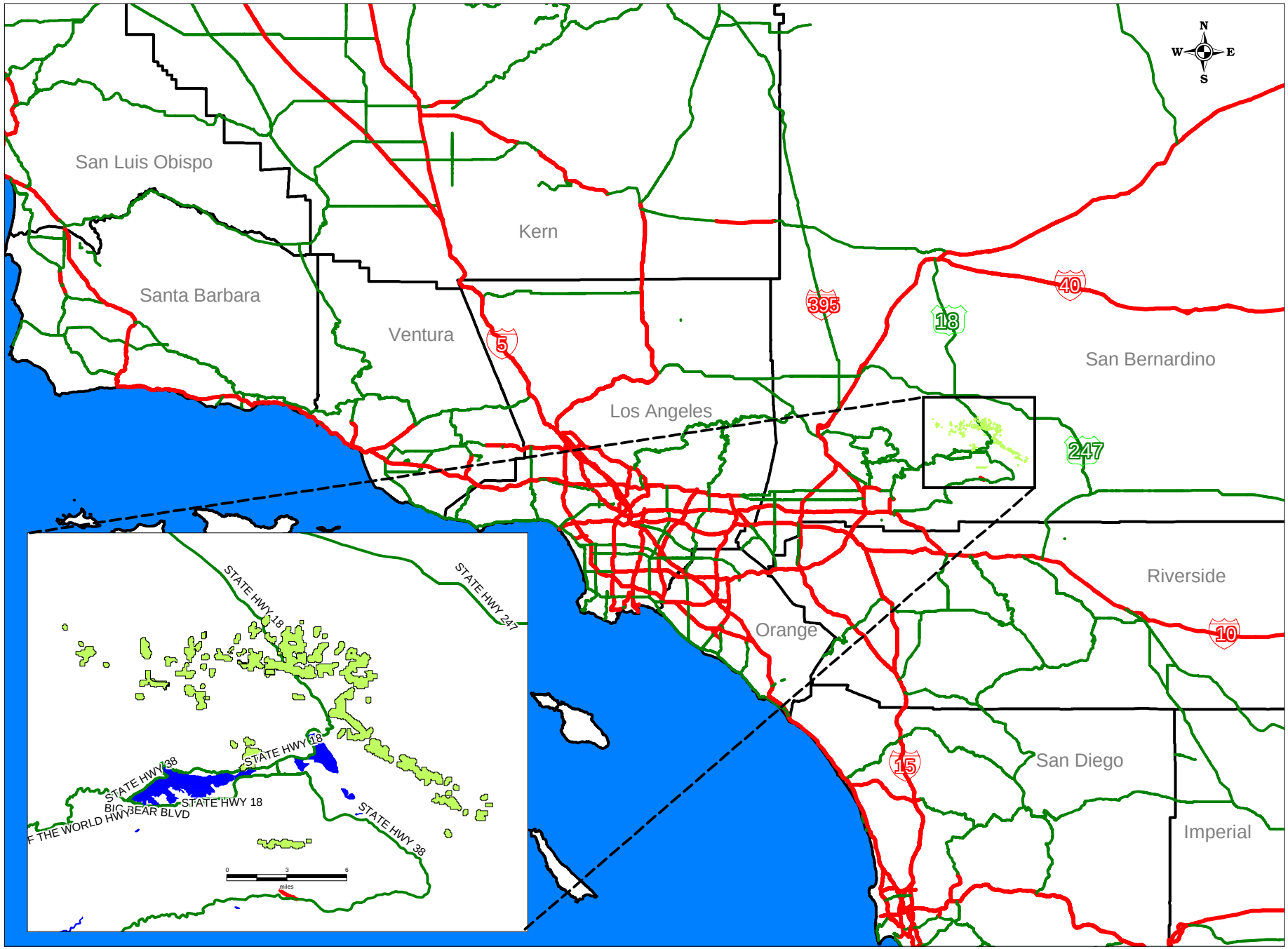
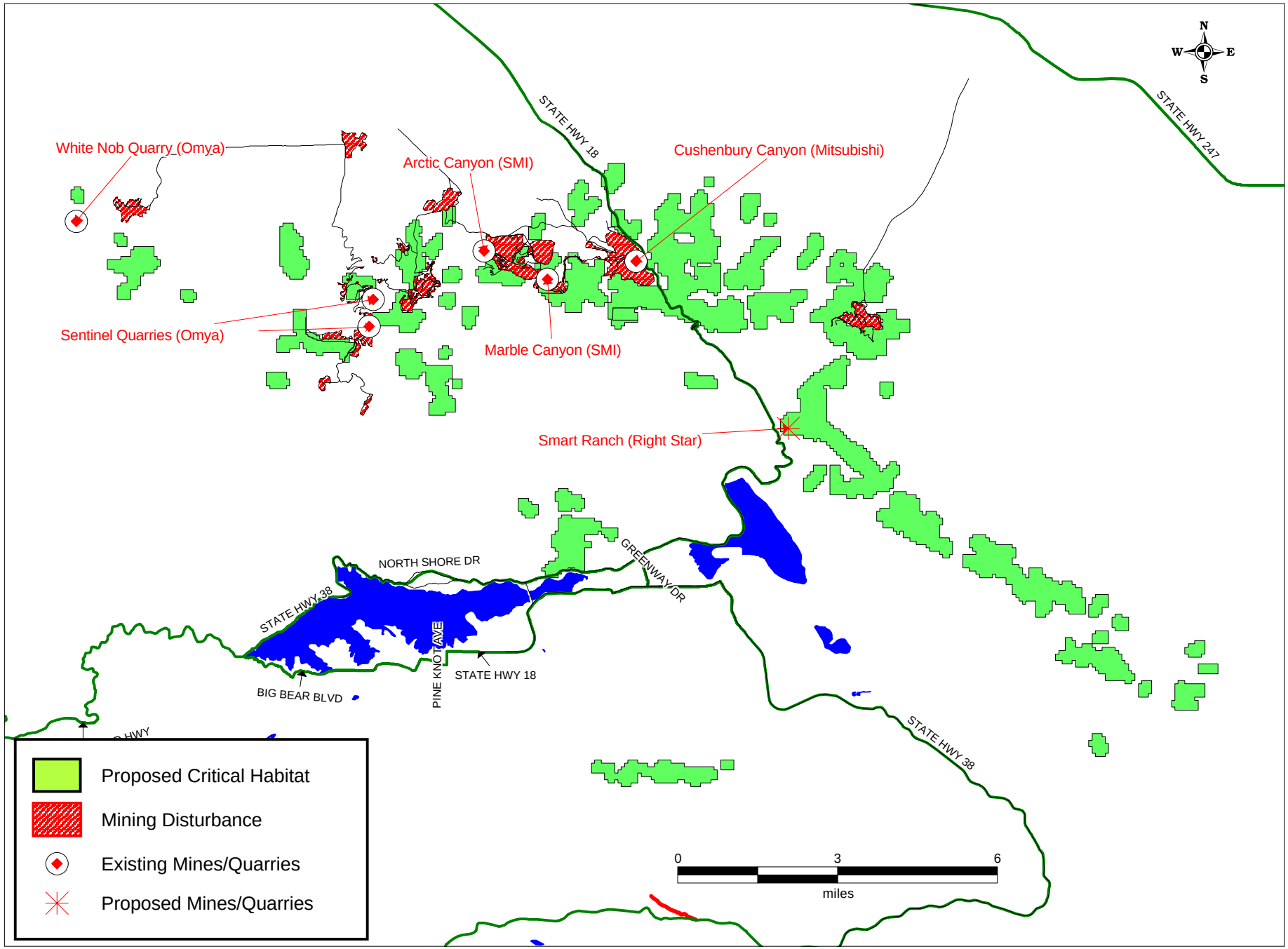


Figure 2
Proposed Critical Habitat Areas and Mining Activities



The proposed critical habitat is located approximately 30 miles east of San Bernardino, California, and consists of blackbrush scrub, canyon live oak, singleleaf pinyon, singleleaf pinyon-mountain juniper, singleleaf pinyon-Utah juniper, and white fir forest vegetation types, interspersed with carbonate rock outcrops. The proposed critical habitat for the carbonate plants occurs on land owned/managed by the U.S. Forest Service (9,695 acres), the Bureau of Land Management (1,585 acres), and a number of private landowners (1,900 acres), the majority of whom hold patented mining claims. All of the carbonate plant species were listed as endangered on August 24, 1994, except the Parish's daisy, which was listed as threatened on the same date.

FRAMEWORK AND ECONOMIC IMPACTS CONSIDERED

This analysis first identifies land use activities within or in the vicinity of those areas being proposed for critical habitat that are likely to be affected by section 7 of the Act. To do this, the analysis evaluates a "without section 7" scenario and compares it to a "with section 7" scenario. The "without section 7" scenario constitutes the baseline of this analysis. It represents the level of protection that would be afforded the species under the Act if section 7 protective measures were absent. This level of protection would include other Federal, State, and local laws. The "with section 7" scenario identifies land-use activities likely to involve a Federal nexus that may affect the species or its designated critical habitat, which accordingly have the potential to be subject to future consultations under section 7 of the Act.

Economic activities identified as likely to be affected under section 7 and the resulting impacts that section 7 can have on such activities constitute the upper-bound estimate of the proposed critical habitat economic analysis. By defining the upper-bound estimate to include both jeopardy and adverse modification impacts, the analysis recognizes the difficulty in sometimes differentiating between the two in evaluating only the critical habitat effects associated with the proposed rulemaking. This step is adopted in order to ensure that any critical habitat impacts that may occur co-extensively with the listing of the species (i.e., jeopardy) are not overlooked in the analysis.

Upon identifying section 7 impacts, the analysis proceeds to consider the subset of impacts that can be attributed exclusively to the critical habitat designation. To do this, the analysis adopts a "with and without critical habitat approach." This approach is used to determine those effects found in the upper-bound estimate that may be attributed solely to the proposed designation of critical habitat. Specifically, the "with and without critical habitat" approach considers section 7 impacts that will likely be associated with the implementation of the *jeopardy* provision of section 7 and those that will likely be associated with the implementation of the *adverse modification* provision of section 7. In many cases, impacts associated with the jeopardy standard remain unaffected by the designation of critical habitat and thus would not normally be considered an effect of a critical habitat rulemaking. The subset of section 7 impacts likely to be affected solely by the designation of critical habitat represents the lower-bound estimate of this analysis.

Two primary categories of potential costs are considered in the analysis. These categories are:

- Costs associated with identifying the effect of the designation on a particular parcel or land use activity (e.g., technical assistance, section 7 consultations).
- Costs associated with any modifications to projects, activities, or land uses resulting from the outcome of section 7 consultations with the Service.

KEY FINDINGS

The key findings are described below. Economic cost estimates by activity are summarized in **Table 1** and cost estimates by proposed critical habitat unit are summarized in **Table 2**.

Total Economic Impact. The total present value of future potential economic impacts from section 7 consultations associated with the carbonate plant listing and proposed critical habitat designation is estimated between $174 million and $281 million, over a 60 year time frame.[1] Unlike previous Economic Analyses, which have traditionally relied on a 10 year time frame to estimate economic impacts, the nature of commercial mining as a long-term economic pursuit requires an expanded timeframe to adequately estimate potential costs associated with the proposed rulemaking. This expanded timeframe also requires applying a discount rate to the stream of future costs in order to express them in terms of constant 2002 dollars (present value). The total present value estimate translates to an annualized cost estimate between approximately $12 million and $20 million per year over the next 60 years.[2]

The total estimated economic impact is composed of a number of separate components, each of which is described later in the Executive Summary. The bulk of the total impact, or 99.9 percent, results from the potential for reduced mining activity in critical habitat Unit 1. Between approximately $58,000 and $89,000, or less than 0.04 percent, of the total estimated economic impact is considered to be attributable solely to the designation of critical habitat.

Finally, this analysis employs a number of conservative assumptions that result in a total cost estimate that is more likely to overstate than understate the actual economic impact. The most significant of these assumptions in terms of their effect on the total cost estimate are described below:

[1] A number of the activities identified as likely to take place within the next 20 years (future limestone mining activities) result in a stream of costs that extends beyond the twenty-year period. Guided by Bureau of Land Management policy, this analysis assumes the active life of any particular mine or quarry is 40 years, meaning the total time horizon for this analysis is 60 years.

[2] The annualized value is equal to an annual dollar amount that, if paid (or received) each year for the next 60 years, would equal the total cost estimate, assuming a discount rate of 7 percent. Thus, annual costs of $12.37 million per year for the next 60 years are equivalent to approximately $174 million in 2002 dollars when discounted at 7 percent annually.

Table 1
Summary of Estimated Future Economic Impact from Section 7 Consultations
Associated with Carbonate Plant Listing and Critical Habitat Designation
Economic Analysis of Proposed Carbonate Plant Critical Habitat Designation

Economic Impact Category	Total Section 7 Impacts		Impacts Due Solely to Critical Habitat Designation	
	Low-Estimate Scenario	High-Estimate Scenario	Low-Estimate Scenario	High-Estimate Scenario
Mining Impacts (1)				
Avg. Annual Job Loss	142	230	--	--
Reduced Value Added (2)	$173,220,773	$279,899,075	--	--
Reduced Mining Consultation Costs (3)	$78,100	$133,300		
Other Consultation Costs (4)	$78,100	$133,300	--	--
Project Modification	$82,878	$123,466	--	--
Subtotal	173,459,851	280,289,141	--	--
Fire Management	$66,000	$109,200	--	--
Recreational SUPs (5)				
Programmatic Consultation	$43,460	$43,460	--	--
Streamlined Informal Consultations	$46,000	$140,000	$23,000	$70,000
Subtotal	$89,460	$183,460	$23,000	$70,000
Grazing Consultation	$3,500	$10,900	$3,500	$10,900
Road & Trail Construction				
Forest Service roads and trails	$22,000	$36,400	--	--
Private road contruction	$14,200	$27,600	--	--
Subtotal	$36,200	$64,000	--	--
Reinitiated Consultations	$11,500	$35,000	$11,500	$35,000
Grand Total	**$173,666,511**	**$280,691,701**	**38,000**	**115,900**
Annualized Grand Total (6)	**$12,370,131**	**$19,993,452**	**$2,707**	**$8,255**

(1) The Low-Estimate Scenario assumes that mining activity would have been initiated on 162 acres of critical habitat land in the next 20 years, while the High-Estimate Scenario assumes that mining would have occurred on 262 acres of critical habitat land in 20 years. Once initiated, mining activity is assumed to occur for 40 years, meaning the total timeframe for this analysis is 60 years.
(2) Refers to the present value of future employee compensation, proprietor income, and indirect business taxes associated with potential foregone mining output.
(3) It is assumed that five consultations for future mining activities in proposed critical habitat will result in Jeopardy Biological Opinions and are thus associated with reduced mining activity.
(4) It is assumed that five consultations for future mining activities will not result in Jeopardy Biological Opinions, and that the proposed mining activities will be allowed to proceed following implementation of project modifications.
(5) Forest Service Special Use Permists.
(6) Represents the annual cost that is equivalent to the Grand Total, with equal annual costs distributed over a 60-year period and discounted to current dollars assuming a 7 percent annual discount rate.

Table 2
Summary of Potential Costs by Proposed Critical Habitat Unit
Economic Analysis of Proposed Carbonate Plant Critical Habitat Designation (1)

Proposed Critical Habitat Unit	Total Section 7 Costs		Costs Due Solely to Critical Habitat Designation	
	Low-Impact Scenario (2)	High-Impact Scenario (2)	Low-Impact Scenario (2)	High-Impact Scenario (2)
Unit 1 (Northeast Slope Unit)	$173,563,579	$280,481,658	$12,219	$37,435
Unit 2 (Bertha Ridge Unit)	$51,026	$102,766	$11,771	$35,825
Unit 3 (Sugarlump Ridge Unit)	$51,906	$107,277	$14,010	$42,639
Grand Total	**$173,666,511**	**$280,691,701**	**$38,000**	**$115,900**
Annualized Grand Total (3)	**$12,370,131**	**$19,993,452**	**$2,707**	**$8,255**

(1) For economic impact categories (see Table 1) that were shared among multiple units, costs were allocated based on a weighted average of SBNF acres in each Unit. The only exception is the Recreational SUP impact category, for which programmatic consulation costs were divided evenly between the affected units (2 and 3).
(2) The Low-Estimate Scenario assumes that mining activity would have been initiated on 162 acres of critical habitat land over next 20 years, while the High-Estimate Scenario assumes that mining would have occurred on 262 acres of critical habitat land in 20 Years. Once initiated, mining activity is assumed to occur for 40 years, meaning the total timeframe for this analysis is 60 years.
(3) Represents the annual cost that is equivalent to the Grand Total, with equal annual costs distributed over a 60-year period and discounted to current dollars assuming a 7 percent annual discount rate.

- **Relationship to Carbonate Habitat Management Strategy.** The Carbonate Habitat Management Strategy (CHMS) is an ongoing collaborative process geared towards developing a management strategy for the carbonate plants that balances habitat protection with continued availability of carbonate reserves for future mining. The CHMS involves a number of stakeholders, including mining companies with operations in the Big Bear area, the Service, the San Bernardino National Forest (SBNF), and the Bureau of Land Management (BLM), and is a voluntary process that was initiated prior to the proposal of critical habitat. Preliminary indications suggest a draft CMHS may be adopted during Summer 2002. Because no CHMS has been adopted as of the date of publication of this report, no consideration was given to the restrictions such an agreement might have imposed on the mining community (i.e., as a "baseline" element). If adopted, however, the CHMS could impose significant restrictions on the amount of future mining that could occur in essential carbonate plant habitat, and could thus significantly change the estimated economic impact of proposed critical habitat designation presented in this report.

- **Reduced Mining in Proposed Critical Habitat is a Net Loss.** As described below, this analysis assumes that some number of acres containing valuable mining reserves will not be mined in the future due to section 7 regulations. This analysis also assumes that the reduction in acres mined within proposed critical habitat will not be off-set by increased mining activities on other acres in San Bernardino County, and is thus a “net loss” to the commercial mining industry. Similarly, this analysis assumes that a certain number of mining industry jobs will be lost due to reduced mining activities, and that these employees would not find work at other facilities or in other industries. In reality, a large proportion of the reduced mining in proposed critical habitat and associated job losses would be off-set by increases at other quarries and/or in other industries, thereby reducing the actual economic impact.

- **All Mining Acres are of Equal Value.** This analysis assumes that all acres of undisturbed potentially viable carbonate reserve are of equal value, irrespective of their distance from existing mining and transportation infrastructure. In reality, mining activities – particularly those activities likely to be initiated within the next 20 years – are more likely to expand in concentric circles around existing infrastructure. Many acres within proposed critical habitat that are considered potentially viable reserves are located significant distances from existing infrastructure; conversely, many acres outside proposed critical habitat that are considered viable reserves are much closer to existing infrastructure. To avoid underestimating the potential impact of the rulemaking, however, this analysis assigns an equal probability of future mining to all potentially viable reserves.

- **Components of Total Economic Impact.** The total estimated economic impact from section 7 consultations associated with the carbonate plant listing and critical habitat designation is composed of the following nine components:

- **Reduced Mining.** The economic cost due to the potential reduced mining activity in the critical habitat area is estimated to range from $173 million to $280 million. There is also a corresponding estimated loss of between 142 and 230 full-time mining related jobs in San Bernardino County over the next 20 years (the average job loss over 20 years). The economic cost estimate is based on the present value of reduced "value added" due to foregone mining activity that would have otherwise commenced during the next 20 years in areas proposed as critical habitat.[3] "Value added" equals the production value or sale price of total mining output minus the costs of the goods and services used to create this output. The high-estimate scenario assumes that 270 acres of viable mining that would have been initiated during the next 20 years will be off-limits to future mining, while the low-estimate scenario assumes that 162 acres of viable mining that would have been initiated during the next 20 years will be off-limits to future mining. This analysis assumes that the reduction in future mining would occur due to five (5) formal section 7 consultations over the next 20 years that will result in Jeopardy Biological Opinions. Jeopardy Biological Opinions are issued when no Reasonable and Prudent Alternatives (RPAs) are envisioned that could allow a project to proceed without jeopardizing the species or adversely modifying critical habitat. Both the high- and low-estimates assume an active life of 40 years per mining acre with future earnings converted to a present value based on a 7 percent discount rate. The entire economic impact estimate due to reduced mining is associated with critical habitat Unit 1. This impact is also attributable co-extensively to the listing because (1) the viable mining areas are either occupied by the plants or the scope of the proposed activity is assumed to be large enough that adjacent occupied areas would likely be affected, and (2) because the mining companies, the SBNF, and theBLM are already aware of the presence of the species as a result of the CHMS.

- **Mining Consultations and Project Modifications**. Based on preliminary determinations of the CHMS process, this analysis assumes that future mining activities will occur on approximately 150 acres of land within proposed critical habitat Unit 1. This estimate is based on a calculation of the acreage overlap between the proposed critical habitat boundaries and areas that were designated as open for future mining in a draft CHMS map provided by the SBNF at the time this report was prepared.[4] This analysis assumes that future mining will be allowed to proceed within the critical habitat area as a result of five (5) formal section 7 consultations over the next 20 years that will lead to project modifications in the form of dust monitoring programs for each proposed project. The present value of future costs due to section 7 consultations and associated project modifications is estimated to range from $161,000 to $257,000, which will be incurred over a 30 year period.[5] These costs are attributable co-extensively to the listing, because (1) the viable mining areas are either

[3] The total economic cost of reduced mining also includes administrative cost associated with section 7 consultations that are assumed to result in Jeopardy Biological Opinions. This analysis assumes five such consultations over 20 years, with a total cost between $78,000 and $133,000 (borne by the Service, the action agency, and the applicant), which represents less than 0.05 percent of the calculated reduction in "value added."

[4] Areas designated as open for future mining are labeled "BCX" on the Draft CHMS map published on February 26, 2002.

[5] Project modifications are in the form of dust management programs implemented as a result of section 7 consultations that occur over a 20 year period. Each dust management program ranges from five to 10 years in length. The final (fifth) consultation is assumed to take place in Year 20, which results in a total time frame of 30 years if the resulting dust management plan lasts the full ten years.

occupied by the plants or the scope of the proposed activity is assumed to be large enough that adjacent occupied areas would likely be affected, and (2) because the mining companies, SBNF, and BLM are already aware of the presence of the species as a result of the CHMS.

- **Fire Management.** Future fire prevention activities carried out by the SBNF in the critical habitat area could result in six (6) formal section 7 consultations over the next 20 years. No associated project modifications are anticipated. Fire management activities could occur in all three critical habitat units. The total cost of these consultations is estimated to range from $66,000 to $109,000, which is due co-extensively to the listing, because (1) fire prevention activities are anticipated to be large enough in scope that occupied critical habitat areas are likely to be affected and (2) the SBNF is aware of the presence of the species due to the CHMS, their Federal listing, and their status as Forest Service special-status species.

- **Recreational Special Use Permits.** The SBNF anticipates engaging in one programmatic section 7 consultation with the Service in order to develop a comprehensive recreational special use permit (SUP) program. Once in place, this program is expected to streamline the recreational SUP process. Recreational SUPs are expected to be issued primarily in critical habitat Units 2 and 3. The total cost of updating the SUP program is estimated to range from approximately $89,000 to $183,000, which includes costs associated with one programmatic consultation and sixty streamlined informal section 7 consultations that would be required to approve individual SUP applications. This analysis estimates that the cost of one standard informal consultation approximates the cost of three streamlined informal consultations, and therefore assumes an effort equivalent to one standard informal consultation will be required each year for the next 20 years. The costs of both the programmatic and informal consultations will be borne by the SBNF and the Service, but not by any third-party applicants. The costs of the programmatic consultation, approximately $43,000 in total, are attributable co-extensively to the listing, because SBNF personnel have indicated that this consultation would have been initiated absent the designation of critical habitat. The remaining costs involve a streamlined section 7 process, whereby letters of concurrence with the programmatic consultation are requested by the SBNF and are issued by the Service on a project-specific basis. This analysis assumes that 50 percent of the letters of concurrence requested in the next 20 years will be for activities in areas that are occupied by the species. The costs associated with these streamlined consultations, which range between $23,000 and $70,000 and are approximated by ten (10) standard informal section 7 consultations, would therefore be attributable co-extensively to the listing. This analysis assumes that the remaining 50 percent of requested letters of concurrence will be for activities in areas that are not occupied by the species. The costs associated with these consultations also range from $23,000 and $70,000, and are attributable solely to the designation of critical habitat, because they are assumed to occur in unoccupied areas where section 7 regulations would not have otherwise applied.

- **Grazing.** According the Bureau of Land Management (BLM), the proposed critical habitat designation is likely to affect one existing grazing allotment. The BLM has already participated in one section 7 consultation with respect to cattle grazing on this allotment, which resulted in project modifications in the form of protective fencing around the occupied portion of the allotment. While

costs associated with these measures are considered part of the baseline, because they occurred prior to the proposed designation, the designation is expected to result in one reinitiated consultation. The reinitiated consultation would be internal to the Service and is not expected to result in any additional protective measures. Consultation costs are estimated to range from $3,500 to $10,900 and are attributable solely to the designation of critical habitat because the Service would not have otherwise required consultation following implementation of the project modifications.

- **Road and Trail Construction.** Although no future road or trail construction is planned within the SBNF, this analysis conservatively assumes that future road and trail construction by the SBNF in the next 20 years will lead to two projects that will require separate, formal section 7 consultations. Future Forest Service roads and trails could be constructed in all three critical habitat units. No public roads are anticipated within the proposed critical habitat area over the next 20 years. Any private road construction will likely be associated with mining operations, which are costs that are included in the mining impact analysis. However, it is assumed that five "technical assistance" inquiries will be made in the next 20 years regarding private road construction, with one leading to a formal section 7 consultation and the other four requiring no additional consultation. The total estimated cost of the consultation and technical assistance inquiries for road and trail construction range from $36,200 to $64,000 over 20 years. These costs are attributable co-extensively to the listing because (1) future construction will either occur in areas occupied by the species or will likely impact adjacent populations if the area is unoccupied due to the relatively small proportion of unoccupied critical habitat and the invasive nature of road construction, and (2) the SBNF is aware of the presence of the species due to their Federal listing as well as their status as Forest Service special-status plants.

- **Activities on Private Land**. Generally, activities on private land do not constitute a Federal nexus, and in such cases, section 7 of the Act does not impose any costs or requirements. If activities on private land require a permit, funding, or oversight by a Federal agency, however, section 7 requirements would apply and could result in economic effects. This analysis considered three potential categories of activity on private land that might involve a Federal nexus, and the potential for economic effects related to section 7: (1) Mining activities on private land (patented mining claims) that require a Section 404 permit from the U.S. Army Corps of Engineers; (2) the potential need for a Section 404 permit for future residential development; and (3) the potential need for a SUP from the SBNF for horseback riding tours originating on private land and traversing Federal land. Economic effects associated with reduced mining when a Federal nexus exists are discussed in detail in the mining sections of this report. Similarly, section 7 regulatory requirements related to SUPs in the SBNF are addressed in a separate section of this report. According to the San Bernardino Planning Department, County planning regulations prohibit residential construction in any drainage channels or basins that might also require a Section 404 permit, so a Section 404 permit is almost never required for residential development projects, and no Federal nexus is assumed to exist.

- **Reinitiated Consultations.** The SBNF estimates that five previous formal section 7 consultations will have to be reinitiated due to the critical habitat designation. The process is expected to be internal to the Service and administrative in nature, and should not result in any impacts to original third-party participants. Two of the consultations would involve all three critical habitat units; two consultations would involve Unit 1 only; and one consultation would involve Unit 3 only. The total cost of reinitiating these consultations is expected to range from approximately $11,500 to $35,000 over 20 years, which is due solely to the designation of critical habitat.

- **Stigma Effects.** Stigma effects are associated with uncertainty over the economic effect of critical habitat designation, and can potentially result in decreased land values. Stigma effects may impact the future value of mining claims on approximately 150 acres of Federal land in critical habitat Unit 1 and on approximately 1,900 acres of private land in Units 1 and 2. The size of this impact is impossible to quantify at this time, but would be due solely to the designation of critical habitat.

- **Benefits.** Potential benefits of the proposed critical habitat designation include improved ecosystem health and water quality; educational benefits; increased support for existing conservation efforts; and reduced uncertainty regarding the extent of carbonate plant habitat and allowable activities. However, it is difficult at this time to estimate the total benefit afforded by section 7 implementation on the proposed designation, since little information is available regarding (1) the likely economic benefits of each consultation and modification; and (2) the extent to which such consultations and modifications would result from the designation of critical habitat. Potential benefits would be associated with all three critical habitat units.

ORGANIZATION OF REPORT

This report is organized into six chapters. **Chapter I** provides an introduction to this report, describes the species and its habitat, and lays out the framework and methodology for the analysis. **Chapter II** describes the County's socio-economic context. **Chapter III** focuses on the economic impact of section 7 on current and planned limestone mining activities. **Chapter IV** estimates the economic costs associated all other project modifications and consultations associated with section 7. **Chapter V** presents the Small Business Regulatory Enforcement Act analysis, and **Chapter VI** discusses the benefits of critical habitat designation.

I. INTRODUCTION & BACKGROUND

On February 12, 2002, the U.S. Fish and Wildlife Service (the Service) proposed designating critical habitat for five plant species -- the Cushenbury milk-vetch (*Astralagus albens*), the Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*), the San Bernardino Mountains bladderpod (*Lesquerella kingii* spp. *bernardina*), the Cushenbury oxytheca (*Oxytheca parishii* var. *goodmaniana*), and the Parish's daisy (*Erigeron parishii*) -- (hereafter the "carbonate plants"), on 13,180 acres of land in San Bernardino County, California. The purpose of this report is to identify and analyze the potential economic effects that would result from this designation. This report was prepared by Economic & Planning Systems, Incorporated (EPS), under subcontract to Industrial Economics, Incorporated (IEc), under contract to the Service's Division of Economics.

Section 4(b)(2) of the Endangered Species Act (the Act) requires that the Service base the designation of critical habitat upon the best scientific and commercial data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

Upon the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.

SPECIES DESCRIPTION AND DISTRIBUTION

A brief description of the five plant species included in the proposed critical habitat designation, referred to collectively as the "carbonate plants," is provided below. Refer to the proposed rule for a more complete description of each species, associated habitat types, and relevant citations.[6]

[6] U.S. Fish and Wildlife Service, *Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for Five Carbonate Plants from the San Bernardino Mountains in Southern California*, February 12, 2002 (67FR6577).

CUSHENBURY MILK-VETCH

The Cushenbury milk-vetch (*Astragalus albens*) is a short-lived perennial plant in the pea family (Fabaceae) characterized by slender silvery-white haired stems and purple flowers. It is typically found on limestone-derived carbonate soils, primarily associated with dry flats and slopes, and occasionally along rocky washes. Known occurrences are scattered along the carbonate belt in the northeastern San Bernardino Mountains extending from Dry Canyon southeastward to the head of Lone Valley, including Cushenbury Canyon and Smarts Ranch Road. This species occurs at the lowest elevational range of the five carbonate plants.

CUSHENBURY BUCKWHEAT

The Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*) is a perennial member of the buckwheat family (Polygonaceae) that forms low, dense mats characterized by round to ovate leaves and whitish-cream flowers. Known occurrences are scattered along the carbonate belt of the northeastern San Bernardino Mountains extending from White Mountain in the west, to Rattlesnake Canyon in the east, including Arctic and Cushenbury Canyons. This species typically grows in carbonate soils on gentle slopes and in open areas with fine soils and little accumulated organic material. The Cushenbury buckwheat was found at the widest elevational range of all the carbonate plants.

SAN BERNARDINO MOUNTAINS BLADDERPOD

The San Bernardino Mountains bladderpod (*Lesquerella kingii* ssp. *bernardina*) is a silvery, short-lived perennial member of the mustard family (Brassicaceae) characterized by elliptic basal leaves and flowers with yellow petals. Its two known occurrences are on the north side of Big Bear Lake near the east end of Bertha Ridge and on the north-facing slope of Sugarlump Ridge south of Bear Valley. It is generally found on dolomite-derived soils, which tend to be located south and west of the majority of the other carbonate plant species. This species occupies the smallest distributional area and the narrowest elevational range of the five carbonate plants.

CUSHENBURY OXYTHECA

The Cushenbury oxytheca (*Oxytheca parishii* var. *goodmaniana*) is a small, wiry annual plant in the buckwheat family (Polygonaceae) characterized by a basal rosette of leaves and small flowers grouped in clusters of 3 to 12. Because it is an annual, has few occurrences, and the total number of individuals at some occurrences is often low, this species may be more susceptible to extinction from environmental stochasticity (random events) than the other four carbonate plant species. Known occurrences are scattered along the carbonate belt in the northeastern San Bernardino Mountains extending from White Mountain in the west to Rattlesnake Canyon in the east, including Cushenbury, Marble, and Arctic Canyons. It is typically found on limestone- and dolomite-derived soils and on gentle slopes. This species occupies the second-smallest geographical area of the five carbonate plants.

PARISH'S DAISY

The Parish's daisy (*Erigeron parishii*) is a small perennial herb of the aster family (Asteraceae) characterized by simple linear leaves with solitary yellow and lavender flower heads borne at the tips of leafy stems. Known occurrences span approximately 56 km (35 mi) along the carbonate belt in the northeastern San Bernardino Mountains, extending from Pioneertown in the east to White Mountain in the west, including Arctic, Cushenbury, and Rattlesnake Canyons. The species usually grows on limestone or dolomite soils occurring on dry, rocky slopes, shallow drainages, and outwash plains. The Parish's daisy has the widest geographic distribution of the five carbonate plants.

PROPOSED CRITICAL HABITAT DESIGNATION

The Cushenbury milk-vetch, the Cushenbury buckwheat, the San Bernardino Mountains bladderpod, and the Cushenbury oxytheca were listed as endangered species pursuant to the Act on August 24, 1994. The Parish's daisy was listed as a threatened species pursuant to the Act on the same date. When a species is listed as threatened or endangered, the Act stipulates that the Service must also "to the maximum extent prudent and determinable…designate critical habitat." On February 12, 2002, the Service published in the Federal Register a proposed rule outlining its proposed critical habitat designation for the five carbonate plants. The proposed rule delineated three critical habitat units comprising the majority of all currently known carbonate plant occurrences: Unit 1, the Northeast Slope Unit, encompasses 11,980 acres, and includes 10,100 acres of Federal land and 1,880 acres of private land; Unit 2, the Bertha Ridge Unit, encompasses 685 total acres, including 665 acres of Federal land and 20 acres of private land; and Unit 3, the Sugarlump Ridge Unit, encompasses 515 acres, all of which are federally owned.

Section 3 (5) (A) of the Act defines critical habitat as "the specific areas within the geographic area occupied by a species…on which are found those physical or biological features… essential to the conservation of the species and…specific areas outside the geographic area occupied by a species…upon a determination that such areas are essential for the conservation of the species." In order to delineate potential critical habitat boundaries, the Service must first use the "best available scientific information" to identify those physical and biological features — or primary constituent elements (PCEs) — that are essential to the conservation of the species. The Service identified species-specific PCEs for each of the carbonate plant species.

The Service used species-specific PCEs, distribution and occurrence data, and occurrence ranking criteria to delineate habitat areas essential for the conservation of the species. Habitat determined to be non-essential through previous Section 7 consultations was excluded. Maps of essential habitat were then overlaid with a 100-meter Universal Transverse Mercatur (UTM) grid. Unoccupied cells that were adjacent to, or contained significant amounts of disturbed areas, were eliminated. Cells with documented occurrences of one or more carbonate plants were included even if the majority of the cell was disturbed.

Existing features and structures, such as buildings, mines that are active at the time of the proposed rule's publication, paved or unpaved roads, other paved or cleared areas, lawns, and other urban landscaped areas do not contain primary constituent elements.

The remaining UTM cells were determined to contain essential habitat for the conservation of the carbonate plants, and constitute the 13,180 acres of proposed critical habitat. Critical habitat was divided into three critical habitat units: the Northeastern Slope Unit (11,980 acres), the Bertha Ridge Unit (685 acres), and the Sugarlump Ridge Unit (515 acres). Combined critical habitat includes 11,280 acres of Federal land (9,695 acres of San Bernardino National Forest (SBNF) land and 1,585 acres of Bureau of Land Management (BLM) land) and 1,900 acre of private land, primarily in the form of patented mining claims. A more complete discussion of carbonate plant occurrences, land ownership within each unit, and species-specific PCEs can be found in the proposed rule.

FRAMEWORK FOR ANALYSIS

The focus of this economic analysis is on section 7 of the Act, which requires Federal agencies to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. Federal agencies are required to consult with the Service whenever they propose an action that may affect a listed species or its designated critical habitat. Aside from the protection that is provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 only applies to activities that are carried out, permitted, or funded by Federal agencies, the designation of critical habitat will not afford any additional protections for species with respect to strictly private activities.

This analysis first identifies land use activities within or in the vicinity of those areas being proposed for critical habitat that are likely to be affected by section 7 of the Act. To do this, the analysis evaluates a "without section 7" scenario and compares it to a "with section 7" scenario. The "without section 7" scenario constitutes the baseline of this analysis. It represents the level of protection currently afforded the species under the Act if section 7 protective measures were absent. This level of protection would include other Federal, State, and local laws. The "with section 7" scenario identifies land-use activities likely to involve a Federal nexus that may affect the species or its designated critical habitat, which accordingly have the potential to be subject to future consultations under section 7 of the Act.

Economic activities identified as likely to be affected under section 7 and the resulting impacts that section 7 can have on such activities constitute the upper-bound estimate of the proposed critical habitat economic analysis. By defining the upper-bound estimate to include both jeopardy and adverse modification impacts, the analysis recognizes the difficulty in sometimes differentiating between the two in evaluating only the critical habitat effects associated with the proposed rulemaking. This step is adopted in order to ensure that any critical habitat impacts that may occur co-extensively with the listing of the species are not overlooked in the analysis.

Upon identifying section 7 impacts, the analysis proceeds to consider the subset of impacts that can be attributed exclusively to the critical habitat designation. To do this, the analysis adopts a "with and without critical habitat approach." This approach is used to determine those effects found in the upper-bound estimate that may be attributed solely to the proposed designation of critical habitat. Specifically, the "with and without critical habitat" approach considers section 7 impacts that will likely be associated with the implementation of the *jeopardy* provision of section 7 and those that will likely be associated with the implementation of the *adverse modification* provision of section 7. In many cases, impacts associated with the jeopardy standard remain unaffected by the designation of critical habitat and thus would not normally be considered an effect of a critical habitat rulemaking. The subset of section 7 impacts likely to be affected solely by the designation of critical habitat represents the lower-bound estimate of this analysis.

The critical habitat designation for the carbonate plants encompasses land under Federal and private ownership. For private lands subject to critical habitat designation, section 7 consultations and modifications to land uses and activities can only be required when a Federal nexus, or connection, exists. A Federal nexus arises if the activity or land use of concern involves Federal permits, Federal funding, or another form of Federal involvement. Section 7 consultations are not required for activities on private lands that do not involve a Federal nexus.

This report estimates impacts of listing and critical habitat designation on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis focuses on activities that are likely to be initiated within a 20-year time horizon, with the economic impact of some of those initiated activities extending greater than 20 years. The 20 year time frame was chosen to capture future mining activities that are reasonably foreseeable to occur beyond a 10 year time frame, which has traditionally been the analytical period used in the majority of the Service's previous economic analyses of proposed critical habitat designation. [7]

METHODOLOGICAL APPROACH

This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts of designation. The methodology consists of:

- Determining the current and projected economic activity within and around the proposed critical habitat area;

- Considering how current and future activities that take place or will likely take place on the Federal and private land could adversely affect proposed critical habitat;

[7] A number of the activities identified as likely to take place within the next 20 years (future limestone mining activities) result in a stream of costs that extends beyond the twenty-year period. Guided by BLM policy, this analysis considers the economic impact of each mining activity that is likely to occur within 20 years over a 40-year time frame from the start date of each assumed mining expansion.

- Identifying whether such activities taking place on privately-owned property within or adjacent to the proposed critical habitat boundaries are likely to involve a Federal nexus;

- Evaluating the likelihood that identified Federal actions and State/local jurisdictional actions having a Federal nexus will require consultations under section 7 of the Act and, in turn, that such consultations will result in modifications to projects;

- Estimating per-unit costs of expected section 7 consultations, project modifications and other economic impacts associated with activities in or adjacent to areas proposed as critical habitat;

- Estimating the upper bound of total costs associated with the area proposed for the designation (including costs that may be attributed co-extensively with the listing of the species) and the lower bound of costs (i.e., costs attributable solely to critical habitat);

- Determining the benefits that may be associated with the designation of critical habitat; and

- Assessing the extent to which critical habitat designation will create costs for small businesses and/or affect property values as a result of modifications or delays to projects.

POTENTIALLY AFFECTED ACTIVITIES

Any activities on Federal lands that may affect the carbonate plants or their critical habitat as well as any activities on State or private lands that require Federal agency approval or oversight would be subject to section 7 consultation. In particular, the proposed rule identified the following activities that, when funded, authorized, or carried out by a Federal agency, may affect critical habitat:

- Removing, thinning, or clearing carbonate plant critical habitat by burning, mechanical, chemical, or other means (including grubbing, grading, grazing, wood cutting, construction, road building and maintenance, mining, herbicide application, and weed abatement);

- Activities that appreciably degrade carbonate plant habitat, including, but not limited to, mining, fire management, livestock grazing, clearing, residential or commercial development, introducing or encouraging the spread of nonnative species, off-road vehicle use, and heavy/intense recreational use; and

- Appreciably decreasing habitat value or quality through indirect effects (i.e., upslope or upstream removal of carbonate substrates, significant watershed alteration).

After reviewing the above listed activities, and conducting interviews with the BLM, SBNF, and mining stakeholders regarding specific activities involving Federal oversight that were likely to occur on their lands, the following potentially affected activities were identified and will be the foci of this analysis:

- Mining activities on Federal land (SBNF and BLM), and to a limited extent on private land when a Federal permit (e.g., a permit under Section 404 of the Clean Water Act from the U.S. Army Corps of Engineers) is required.
- Fire management activities conducted by the SBNF.
- Recreational Special Use Permits (SUPs) issued by the SBNF.
- Cattle grazing on BLM land.
- Road and trail construction.
- Activities on private land that require a Federal permit.
- Five previous section 7 consultations that may require re-initiation following the designation of critical habitat.

II. SOCIO-ECONOMIC CONTEXT

The economic impact of a critical habitat designation will be influenced by the socio-economic conditions and trends in the broader geographic region that encompasses the proposed critical habitat area. The carbonate plant proposed critical habitat designation area is located in the San Bernardino Mountains in San Bernardino County. This chapter provides an overview of the economic and demographic trends in this region, focusing on San Bernardino County and its relationship to neighboring urbanized areas.

OVERVIEW

San Bernardino and neighboring Riverside counties comprise what is commonly known as the Inland Empire, one of the fastest growing metropolitan regions in the nation. The two counties are located about 30 miles inland from the Pacific Ocean and adjacent to the large population centers of Los Angeles, Orange, and San Diego counties. As such, the region is linked both economically and culturally to southern California in general and the Los Angeles basin in particular. The area has developed as a low-cost housing market and distribution center serving the larger markets to the south and west, and through them, the Pacific Rim.

Encompassing over 20,000 square miles, San Bernardino County is physically the largest county in the United States. However, about 90 percent of the County is northeast of the San Bernardino Mountains and classified as desert. Most of the County's population is concentrated in the San Bernardino Valley southwest of the San Bernardino Mountains and close to Los Angeles and other southern California urban areas. Because of its vast and scenic geography, the County serves as a major tourist destination for these urban centers and the nation as a whole. In addition to the popular winter sports areas in the San Bernardino Mountains, the County is home to East Mojave Scenic Area, Death Valley National Monument, the Joshua Tree National Monument, and the San Bernardino National Forest.

The proposed critical habitat area is located in a relatively rural part of the County in the San Bernardino Mountains, with Big Bear Lake serving as the closest incorporated city. The Big Bear area incorporates most of the critical habitat as well as several ski resorts, much of the San Bernardino National Forest, and several small residential communities mostly clustered around Big Bear Lake and Baldwin Lake. The total residential population of the Big Bear area is estimated at about 11,000, most of which is located in or around the City of Big Bear Lake. The communities are oriented primarily to the tourism economy.

POPULATION AND HOUSING

The Inland Empire's combined population is larger than that of 20 individual states and is increasing by close to 100,000 residents each year. The population of San Bernardino County alone is currently at over 1.7 million, an increase of about 291,000 persons, or 21 percent, since 1990. Overall, the County ranks as the fourth most populated county in California out of 58 counties, behind Los Angeles, Orange, and

San Diego counties. However, the County's biggest City, San Bernardino, is ranked only 18th in the State with a population of about 190,230 or 11 percent of the County total. About 17 percent of the County's population lives in unincorporated areas with the remainder living in one of the County's 24 cities. Thus, the population is relatively dispersed along a swath of urbanized areas running east to west through the San Bernardino Valley.

Population projections suggest the County will continue to grow at a relatively fast pace, generating demand for new housing and other development activity. As in the past, this growth is likely to remain concentrated within the San Bernardino Valley and linked to the southern California markets. By the year 2020, San Bernardino County is projected to be home to more than 2.8 million residents, an increase of 65 percent over current levels. One of the factors driving growth is the low cost of housing relative to neighboring markets. For example, the median home price in the County in 2001 was about $135,000, compared to $236,000 in California as a whole.

ECONOMY

As mentioned above, the economy of San Bernardino County is closely linked to southern California through both trade and commute patterns. For example, the County provides low cost warehouse distribution and industrial space that supplies manufacturing and processed agricultural products to the Los Angeles and Orange County markets and in some cases for shipment to international markets in the Pacific Rim. The County also provides a labor force for jobs in southern California cities and as such serves as a bedroom community for these larger employment centers. For example, San Bernardino has a civilian labor force of about 791,500 compared to about 544,400 in total employment, according to the California Employment Development Department. Given that the unemployment rate is about five percent, this suggest a significant out-commute to neighboring job markets to the south and west.

The County has a relatively diverse economic base led by services, government, and retail/wholesale trade. As shown in **Table 3**, these three sectors account for almost 70 percent of total employment. Historically, the County has also benefitted from its rich resource base, including resource-extraction industries such as mining and agriculture, as well as resource enjoyment-related industries including outdoor recreation and tourism. However, compared to total County employment these sectors are currently relatively small. For example, the mining sector currently provides an estimated 4,600 jobs through both extraction and processing activities, less than one percent of total employment. Overall, the County is expected to continue to show steady employment growth and diversification led by significant increases in population and continued linkages to the southern California and international economies.

Table 3
San Bernardino Employment by Sector, 1999
Economic Analysis of Proposed Carbonate Plant
Critical Habitat Designation

Sector	Employees (1)	Percent
Agriculture	11,910	2%
Mining	821	0.12%
Construction	50,427	7%
Manufacturing	71,701	10%
Mineral Processing	3,784	0.54%
TCPU (2)	37,786	5%
Wholesale/Retail	157,043	22%
FIRE (3)	38,688	5%
Services	205,664	29%
Tourism Related	13,741	2%
Government	113,489	16%
Total	705,055	100%

(1) Based on data provided by Implan.
(2) TCPU = Transportation, Communication, and Public Utilities
(3) FIRE = Finance, Insurance, and Real Estate

III. IMPACT OF DESIGNATION ON MINING ACTIVITIES

This Chapter describes the limestone mining industry from both a national and regional perspective, including pertinent regulations, operations, products, and markets. The Chapter then examines and quantifies how the proposed designation of critical habitat might affect future limestone mining activities in the San Bernardino Mountains. **Chapter IV** examines and quantifies the potential effects of proposed critical habitat designation on land uses other than mining.

REGULATORY BASELINE

This section describes the regulatory environment surrounding mining operations in California. The first sub-section describes general mining laws and concepts that will be referred to throughout this report, and the second sub-section describes the suite of mining regulations that constitute the "regulatory baseline" for the purposes of this analysis.

GENERAL MINING REGULATORY BACKGROUND

Modern mining activities continue to be governed primarily by the General Mining Law of 1872 (30 U.S.C. 22-54), which establishes the legal basis that allows citizens to explore, discover, claim, and purchase valuable mineral deposits on Federal lands that are open to mining. For the purposes of the ensuing discussion, several key mining concepts and terms, as defined by the General Mining Law and refined by subsequent court decisions, warrant initial consideration:

- **Location of a mining claim.** Any citizen has a right to locate a mining claim. A mining claim is a particular parcel of Federal land, valuable for a specific mineral deposit, for which an individual has asserted a right of possession. That right is restricted to extraction and development of the mineral deposit, and is not a right of ownership. Claims can, however, be leased, transferred or sold. A claim can be made (or located) only for "locatable" minerals.[8] There are two primary types of mining claims -- lode claims and placer claims.

- **Lode versus placer claims**. Lode claims are made for deposits that exhibit classic veins, or lodes, having well defined boundaries. These typically include quartz or other veins bearing metallic minerals, as well as broad zones of mineralized rock. Placer claims are made for all deposits not subject to lode claims, and traditionally include deposits of unconsolidated material (sand, gravel) containing free gold or other minerals. By judicial interpretation, non-metallic bedded deposits such as high-calcium limestone of the type found in the San Bernardino Mountains are usually

[8] Locatable minerals include metallic minerals and uncommon varieties of non-metallic minerals for which a claim can be located. There is no list of all minerals that are considered locatable. A variety of court decisions have determined that high-calcium limestone is considered a locatable mineral. Other mineral classifications are "salable," which includes common varieties of sand, gravel, and stone, and "leasable," which includes oil, gas, coal, and geothermal resources. Salable minerals must be purchased from the Federal government at market value, and leasable minerals must be leased at market rates.

considered placer deposits. Placer claims are located by legal subdivision (township/range), and the maximum size of a single claim is 20 acres. A maximum of eight adjacent claims held by individual locators can be associated to form a single 160 acre placer claim.

- **Mineral patents**. A citizen who has properly located a mining claim has the right to develop the claim, and to extract and sell any minerals from within the claim. The land title is still held by the Federal government, however. If a claimant can demonstrate the existence of a valuable mineral or deposit within the claim, the claimant can apply for a mineral patent, which gives the claimant exclusive title to the locatable minerals as well as surface and other resources. A patented mining claim becomes private land. Obtaining a patent requires a demonstration of "economic viability" of a claim which can represent a significant burden and requires meeting the "prudent man" and "marketability" tests (collectively referred to as "discovery"). The quality and extent of the mineral deposits must be such that "…a person of ordinary prudence would be justified in the further expenditure of his labor and means, with a reasonable prospect of success in developing a valuable mine…" and that the mineral can be mined, removed, and sold at a profit.[9]

Patented claims are privately owned land, so activities on those lands once they have been patented are not subject to section 7 of the Act, except when some other Federal nexus is present (e.g., a Section 404 permit pursuant to the Clean Water Act is required). While a number of patented mining claims exist in the San Bernardino mountains, there has been a Federal moratorium on new patents since 1992. All existing unpatented mining claims are therefore still under Federal ownership, and activities on those lands are governed by applicable statutes and regulations. A mining claim grants the claimant the right to develop the claim and extract subsurface mineral resources; it does not, however, address or specify rights with respect to surface activities. Land within the critical habitat area includes private land (patented mining claims) and Federal land managed by the SBNF and the BLM. Each Federal agency must comply with distinct legal management guidelines. Furthermore, State mining law imposes additional regulatory constraints, and assigns regulatory jurisdiction to the County.

REGULATORY BASELINE

The regulatory baseline includes all regulations that would apply in the world "without section 7." These include all pertinent Federal, state, and local laws and policies, as well as regulations associated with sections of the Act other than section 7.

Forest Service Regulations

Management of surface mining activities on Forest Service lands is regulated by the Forest Service Minerals Code (36 CFR 228). These regulations require that any proposed operation that could likely cause "significant disturbance of surface resources" must submit a plan of operation (PoO). The PoO should describe the nature of the proposed activity, steps to protect surface resources, and steps to

[9] U.S. Geological Survey Interagency Minerals Coordinating Groub Web site, http://imcg.wr.usgs.gov/usbmak/mgintro.html, March 5, 2002.

reclaim the land after mining-related activities have been completed. PoOs that address proposed actions with potentially significant environmental impacts are subject to review under the National Environmental Policy Act (NEPA).

Bureau of Land Management Regulations

Management of surface activities on BLM lands are subject to the regulations of the Secretary of the Interior (43 CFR 3800-3870). When proposed activities are expected to disturb surface areas greater than five acres, a PoO and a reclamation plan must be submitted to the BLM. These must include a description of the proposed activities, road access and construction, reclamation measures, and time frame of operations. Proposed activities can not proceed until plans have been approved. Review and approval of PoOs is subject to NEPA review. Proposed surface disturbances less than five acres usually only require a notice and not a PoO or full reclamation plan. Receipt and review of a notice is not considered a Federal action and is therefore not subject to NEPA review.[10]

California Surface Mining and Reclamation Act (SMARA)

The State of California Surface Mining and Reclamation Act of 1975 (SMARA) Public Resources Code, Div. 2, Ch. 9, Sec. 2710) regulates surface mining and reclamation on public lands in California. For proposed operations that would remove more than 1,000 cubic yards of overburden, SMARA requires that a Reclamation Plan be prepared and filed with the jurisdictional County (San Bernardino County in the Big Bear area). The Reclamation Plan must establish site-specific reclamation criteria based on statewide reclamation standards.

SMARA standards include, among other requirements, the following specific revegetation protocols: (1) reclaimed vegetative cover must be capable of self-regeneration and of similar density and species-richness as native cover; (2) test plots must be conducted simultaneous with mining to identify appropriate revegetation techniques; (3) native plants should be used when possible; and self-sustaining revegetation success must be shown for a minimum period of two years following surface disturbing activities. These requirements exist independent of species listing under the Act.

California Environmental Quality Act (CEQA) and SMARA

Review and approval of a Reclamation Plan by a County under SMARA represents a discretionary project approval and is subject to review under the California Environmental Quality Act (CEQA). CEQA applies when a project is funded, permitted, or approved by a California public agency, and can require preparation of an Environmental Impact Report (EIR) if the lead agency issues a "finding of significance" following an initial study. A "finding of significance," and any associated project modifications designed to minimize direct or indirect impacts, are more likely to occur if Federally listed species are present.

[10] Ibid.

In 1996, the San Bernardino County Planning Department approved a Reclamation Plan for Specialty Minerals, Inc.'s (SMI) proposed Arctic Canyon Quarry, which was the first reclamation plan approved following the listing of the carbonate plants as threatened/ endangered. The proposed quarry was located entirely on patented mining claims, so there was no Federal nexus and no basis for section 7 consultation. The approved reclamation plan included a number of reclamation measures more stringent than those specifically required by SMARA, including: (1) revegetation with carbonate plant species (as opposed to the more general requirement for native species); (2) the construction and operation of a carbonate plant nursery to improve carbonate revegetation techniques and provide stock; and (3) required conservation set-aside acres for every acre of disturbed carbonate plant habitat. These expanded measures were included based on the presence of the Federally listed carbonate plants and essential habitat.

After considering the proposed plan's "non-mitigable impacts," the County granted approval by issuing a Statement of Overriding Considerations, citing both the project's potential benefits and the expanded reclamation measures. Although approval of the plan was contingent on these expanded measures, they were developed entirely outside the context of section 7 consultation. As such, they are considered part of the regulatory baseline, and are not included as components of the "with section 7," or "upper-bound," analysis.[11] Similarly, any other CEQA-related costs or project modifications that may occur in the absence of section 7 nexus are considered part of the regulatory baseline.

Other Regulatory Considerations

In addition to the regulatory requirements above that apply to all mining operations, several potential site-specific regulations and industry constraints may apply to limestone mining in the San Bernardino mountains, and warrant consideration.

- **Section 404 permitting.** Under Section 404 of the Clean Water Act (33 U.S.C. 1344), a permit is required from the U.S. Army Corps of Engineers when mining activities may fill " waters of the United States," including qualifying wetlands. Some current, and potential future, mining activities are located in canyons and drainage basins, and excavation and overburden stockpiling may require 404 permitting in such cases. Review and issuance of a 404 permit is a Federal action, is subject to NEPA review, and may be subject to section 7 consultation.

- **California Desert Conservation Area**. Portions of the San Bernardino mountains are located within the California Desert Conservation Area (CDCA), a 25 million acre area established by Congress in 1976 (14 U.S.C. 1781) to be managed by the BLM. The location of mining activities within the CDCA may impose additional environmental and/or mitigation requirements above those required by standard mining regulations, which would be considered part of the regulatory baseline.

[11] A number of participants in SMI's Arctic Canyon approval process have confirmed that the expanded mitigation measures were adopted based on the County's requirements for issuance of a Conditional Use Permit (a component of the Reclamation Plan), and not in consideration of any section 7 involvement. Indeed, as the entire proposed quarry was located on patented (private) land, the Service had no jurisdiction under section 7. *Personal communication with Senior Planner, San Bernardino County Planning Agency,; Mineral Examiner, Bureau of Land Management; Senior Botanist, San Bernardino National Forest; and Fish and Wildlife Biologist, U.S. Fish & Wildlife Service. May 28, 2002.*

- **Forest Service Special Status Species**. Section 2600 of the Forest Service Manual establishes guidelines for the listing of special status plant and animal species on Forest Service land to identify threatened endemic species and implement management practices to promote recovery. This listing is independent of listing under the Act. Several of the carbonate plants were listed by the SBNF as special status plant species prior to Federal listing. Special status listing may confer additional protective status with respect to management actions approved by the SBNF, which would be considered part of the regulatory baseline.

- **California Endangered Species Act.** The California Endangered Species Act (CESA) generally parallels the main provisions of the Act, providing for the listing and protection of threatened and endangered species native to California. None of the carbonate plants are listed as endangered or threatened by the State of California. Therefore, CESA does not provide baseline protection for these species.

- **Carbonate Habitat Management Strategy**. The Carbonate Habitat Management Strategy (CHMS) is an ongoing cooperative effort among the Service, SBNF, BLM, San Bernardino County, the California Native Plant Society, mining companies in the Bear Valley area, and other stakeholders. It is geared toward establishing a strategy to balance future mining activity with carbonate plant habitat protection. This process has been ongoing for approximately five years, and the participants expect that a draft CHMS will be adopted in Summer 2002. While the CHMS may ultimately establish management protocols for future activities within carbonate plant habitat areas, the fact that it has not yet been officially adopted precludes its consideration as an existing baseline element as part of this analysis. Nonetheless, certain aspects of this economic analysis (discussed below) rely upon information generated as part of the CHMS process, as it represents the best available information to date.

INDUSTRY BACKGROUND

The mining of carbonate rock is one of the most significant mining activities in the country in terms of annual production (gross tonnage), market value, and variety of end uses. Mined carbonate rocks are dominated by limestone and dolomite, which are differentiated by mineral content, with dolomite containing measurable concentrations of magnesium. Both rock types are found throughout the United States, and were formed when ancient seabeds, containing large quantities of calcium-rich shells, were overlaid with layers of sand and mud that gradually lithified over geologic time to produce widespread calcium carbonate sedimentary deposits. As a result, carbonate deposits are extremely widespread, and are mined in virtually every state in the nation, as well as in many countries throughout the globe.

While carbonate deposits are widespread, there are significant differences in quality that determine the potential end uses, and value, of a particular deposit. Limestone, the most common carbonate rock, is used in a variety of products, each of which requires specific grain sizes and physical properties. The lowest grade deposits are used as aggregate (rock) in concrete. Higher grade limestone is used to

produce Portland cement --the fine-grained binding agent in concrete -- which itself is divided among various grades by chemical property and brightness. Finally, the highest grade limestone is extremely pure and is ground to uniform, microscopic grain size. The resulting product, referred to as ground calcium carbonate (GCC), is used in calcium-rich food additives, pharmaceuticals, and expensive brighteners and fillers to make paint and paper smooth, bright, and opaque.

Based on the types of limestone present in the San Bernardino Mountains, this analysis will focus on two grades of limestone: mid-grade limestone used to produce Portland cement, and high-grade limestone used to produce GCC. The industry dynamics for each are described further below.

PORTLAND CEMENT

Portland cement is a calcium silicate cement made from carbonate rocks (usually limestone), and is the fundamental ingredient in concrete. Carbonate deposits are mined from quarries where the raw materials are run through crushers, then sorted by chemical composition at the cement plant. The crushed material is fed through a high-temperature rotating kiln, which produces fused cement pellets, called clinker. The clinker is finely ground and combined with gypsum to produce Portland cement. Eventually, the cement is combined with gravel, sand, and course stone aggregate to form concrete. When water is added to this mixture, a chemical process called hydration occurs, which causes the cement to harden and gain strength. Portland cement is the only binding agent currently used in concrete manufacturing.

Portland cement is divided into five grades depending on its physical and chemical properties. Type I is all-purpose cement; Type II produces less heat while curing and has moderate sulfate resistance; Type III is quick setting; Type IV has a low heat of hydration and develops strength slowly, making it ideal for dam construction; Type V has high sulfate resistance and is often used where concrete is in contact with high-sulfate groundwater. Portland cement produced in the San Bernardino Mountains in the vicinity of the critical habitat area is typically Type II/V (low heat/sulfate resistant) or Type III (quick setting).

National Market Economics

According to the Mineral Yearbook 2000 prepared by the U.S. Geological Survey, a total of 83.5 million metric tons (tons) of Portland cement was produced at 116 plants in 37 States in 2000, with a value of nearly $6.5 billion. This represents a 2.4 percent increase over the previous year and a new record for national production. Production in 2000 corresponds to approximately 82 percent utilization of total plant capacity.

Total consumption of Portland cement in the U.S., which is driven primarily by construction activity and thus linked to economic growth, reached more than 105 million tons in 2000, with a value at approximately $7.8 billion. Of this, approximately 88 percent was Type I or II gray cement, four percent each were Type III and V cements, and less than one percent was white cement. Domestic consumption exceeded domestic production by approximately 22 million tons, the difference made up by foreign imports. The largest exporters of gray Portland cement to the United States in 2000 were Canada (18 percent), Thailand (16 percent), and China (15 percent).

Housing construction has traditionally been an accurate indicator of Portland cement consumption. According to the National Association of Homebuilders, national housing construction is forecast to remain near current levels through 2010. Annual Portland cement consumption can therefore be expected to remain around 105 million tons over the same period. Approximately 25 million tons of additional annual capacity are expected to come on line by 2005 due to plant expansion projects planned or underway, which would bring annual production to approximately 108.5 tons. This 30 percent increase in capacity would therefore significantly reduce the need for imported cement and clinker, although imported products will continue to be available on the market at competitive prices.

Regional Market Economics

According to the Mineral Yearbook 2000, approximately 8.1 million tons of Portland cement were produced in southern California at eight plants in the year 2000.[12] Using composite national prices for Portland cement, this production has a market value of approximately $624 million, and represents a 7.3

percent increase in production over the previous year. This level of production also represents 9.7 percent of total U.S. production, making the southern California state subdivision the single largest producer of Portland cement of any other state or state subdivision. On average, the eight cement plants in southern California are operating at approximately 90 percent of full capacity.

Only one of these companies, the Mitsubishi Cement Corporation, mines limestone from the San Bernardino Mountains in the vicinity of the critical habitat area. According to numbers provided by the California Cement Promotion Council (CCPM), annual production by Mitsubishi is approximately 1.7 million tons, which constitutes between 18 and 20 percent of the total southern California production, and approximately 1.75 percent of national production.

The majority of cement produced in southern California serves the Inland Empire, the Los Angeles Basin and San Diego areas. All of the cement currently produced at the Mitsubishi plant is consumed within this region. According to the Mineral Yearbook, southern California consumed approximately 8 million tons of Portland cement in 2000. While production appeared to exceed consumption in 2000, some of the regional products were shipped outside the region and some foreign products were imported. The CCPM indicated that regional consumption currently exceeds supply, which is supported by the fact that 1.6 million tons of cement (Portland and masonry cement combined) and clinker were imported in 2000, the majority from China.

The southern California Association of Governments estimates that housing growth in southern California will average approximately 1.7 percent per year through 2015, while major cement producers estimate growth rates between 3 and 5 percent. Assuming a 3 percent growth rate, regional cement consumption is projected to reach 12.5 million tons by 2015. Future consumption appears strong and

[12] The "Southern California" state subdivision, as defined in the Mineral Yearbook report, includes the following counties: Mono, Inyo, San Bernardino, Kern, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, Riverside, San Diego, and Imperial.

regional production, already operating at near capacity, may not be able to meet future demand. Thus, it is likely that regional consumers will begin to depend more heavily on imported Portland cement, which will likely continue to be readily available at competitive prices.

GROUND CALCIUM CARBONATE

While limestone is an abundant rock type, high purity limestone used to produce GCC represents less than 10 percent of recovered carbonate reserves. Nevertheless, GCC is one of the most widespread industrial minerals due to its availability, low cost (relative to potential substitutes), brightness, low oil absorption, and wide range of particle size.[13] GCC quality is determined by uniform particle size, with price increasing significantly with decreasing size, and increasing brightness. GCC is used in a range of products: as an inexpensive additive to latex in carpet backing, as a brightener in caulks and sealant; and as a "filler" in high grade paper, providing smoothness, brightness, and opacity.

Course GCC (22 to 50 microns mean particle size; $21-$25 per ton) is typically used to produce joint cement, carpet backings, and asphalt roofing and as an agricultural and food additive; medium grade GCC (10-22 microns; $40-$72 per ton) is used for sealant and adhesives; fine grade GCC (3-10 microns; $52-$150 per ton) is used for paint, plastics, paper, and rubber; and ultra-fine GCC (0.5-2 microns; $140-$290 per ton) is used for high quality paper coatings, paints, and plastics. Chemical purity (lack of trace minerals) contributes to GCC brightness, and is also necessary for food- and pharmaceutical-grade products. The highest quality GCC products compete with a similar limestone-derived product called precipitated calcium carbonate (PCC). PCC grain size can be "grown" to exacting specifications, and PCC is widely used in the paper coatings industry.

The "high-brightness" limestone mining operations in the San Bernardino mountains are able to produce very high quality GCC. While specific company grades and product lines are difficult to obtain (given the proprietary nature of information within the mining industry), industry estimates obtained from a BLM mineral commodities expert suggest that the two GCC operations in the San Bernardino Mountains produce high-purity, high grade GCC products. Five principal product groups were identified, listed in order of increasing grade, with estimated percent production reported in parentheses: decorative rock (0.5 percent); animal feed (3.5 percent); additives for industrial sealants and adhesives (33 percent); and high grade fillers and extenders for plastic, paint, and paper (64 percent). Products also include food- and pharmaceutical-grade additives, as well as fluxes for glass and smelting, but no specific production estimates for these products were obtained.

National Market Economics

According to a survey of the GCC market in the trade journal, "Industrial Minerals," North American GCC production capacity in 2000 totaled between 13.5 and 14.5 million tons. Production was dominated by five major companies with 31 plants, while 16 smaller companies operated an additional 23 plants. The plants are distributed throughout the U.S. and southern Canada, and production within each plant

[13] "Crushed, Ground, and Bagged North American GCC," Industrial Minerals, January 2002.

serves only the surrounding region due largely to high transportation costs. Production in Vermont and Ontario serve the northeast, Maryland serves the mid-Atlantic, Alabama and Georgia serve the southeast, Illinois serves the midwest, Texas serves the south, and California and Washington serve the west and northwest. Foreign imports played a very small role in the market due to the extremely high international transportation costs.

According to research done by Kline & Company, the volume of the North American GCC market was around 35 million tons in 2000 (which includes large quantities of course GCC products), while the "value-added" (ultra fine-grain) GCC market totaled around 5.7 million tons. The top three industries by consumption were paper, plastics, and adhesives/sealants, which each consumed approximately 1.3 million tons. Kline & Company estimates that the value-added GCC market as a whole will continue to grow at GDP rates, while the paper, food, and healthcare industries will drive growth around 8-10 percent per annum. While foreign imports are not currently cost effective, Jamaica has approximately 350 million tons of high grade reserves and currently imports some GCC for paints and fillers. Cuba, and Haiti are also believed to contain significant high-grade deposits, and are located closer to the United States.

Regional Market Economics

The southern California GCC market is served by two primary producers -- Omya and Specialty Minerals, Inc. (SMI), both of which operate plants in the Lucerne Valley, in the vicinity of the critical habitat area. One smaller producer, American Ingredients, also produces GCC for the region from a plant in Anaheim, California. In addition, two plants in Arizona (one owned by Omya), three in Washington state, and one in British Columbia, also contribute to production in the western U.S. Finally, an underground mining operation in the vicinity of the critical habitat area has been proposed for the extraction of food and pharmaceutical grade limestone and is currently in the permitting process.

Both Omya and SMI extract limestone from several quarries in the San Bernardino Mountains, which they truck to their plants in Lucerne Valley for processing. Plant-specific production values were not available. Dividing total North American production for each company by their number of operations results in an average annual production of approximately 500,000 tons for each San Bernardino plant.

According to data collected by Redlands University for its Carbonate Species Project, annual production of GCC in the Bear Valley area was approximately 1.5 million tons, with an estimated gross value of $75 million.

No region-specific GCC consumption data were available. Anecdotal evidence as well as the relative stability of GCC prices over the past five years suggest that regional supply was sufficient to meet regional demand over the period. No foreign GCC products are known to be imported into the region, also supporting this conclusion. As with Portland cement, it is expected that future GCC consumption will track housing construction due to its predominant use in building and construction applications, resulting in a forecasted growth rate between 1.7 and 5 percent per year.

MINING OPERATIONS IN THE CRITICAL HABITAT AREA

A large proportion of the proposed critical habitat in Unit 1 is comprised of lands held under mining claims by various entities. There are three mining companies and one proposed operator in the San Bernardino Mountains with operations that could intersect with the carbonate plant critical habitat in the foreseeable future, as illustrated in **Figure 2** and described further below. These mining companies hold a number of mining claims in the proposed critical habitat area on which mining activities could be initiated at some point in the future. In addition, the Cushenbury Mine Trust (CMT), as well as a number of private individuals, hold mining claims in the proposed critical habitat area. Although these entities are themselves not likely to engage in mining operations, they may lease or sell their claims to the mining companies at some point in the future. As discussed later in this chapter, it is impossible to determine with any certainty where and to what extent mining activities in the next 20 years will occur. The mining companies themselves are unwilling to provide detailed information on their future mining plans given the proprietary nature of such data. However, it is recognized that some degree of intersect likely exists between proposed critical habitat and the preferred location of future mining, considering that the proposed critical habitat area contains more than 200 separate mining claims.

The available information on the four companies that currently dominate commercial mining in the Bear Valley area is provided below.

Mitsubishi Cement Corporation

Mitsubishi's current operations are limited to one quarry at Cushenbury Canyon, which is adjacent to their processing plant approximately eight miles south of Lucerne Valley on Highway 18. This quarry yields over 2.4 million tons of limestone each year to support annual production of approximately 1.7 million tons of Portland cement. In addition, Mitsubishi has submitted a Notice of Preparation for a Draft Environmental Impact Report related to a proposed quarry on approximately 200 acres of patented land. No information was available regarding quarry acreage or claim type.

Omya

Omya's (formerly Pluess-Staufer) current operations consist of two quarries from which it extracts limestone for processing at its Lucerne Valley plant. The Sentinel Quarry is located approximately five miles south of its processing plant, and is accessed via the vested Crystal Creek haul road. The quarry includes a total of 41.5 acres of unpatented placer mining claims leased by Omya, with land title belonging to the USFS. These acres were permitted for disturbance and reclamation in a 1994 Reclamation Plan. In addition, the USFS approved a quarry expansion plan in February 2002, which would allow for an additional 32 acres of leased unpatented claims to be disturbed and eventually reclaimed. Omya estimates that over a 37 year period (1998 to 2035), approximately 10 million tons of suitable limestone and 8 million tons of waste rock would be removed from the quarry. The 1994 Reclamation Plan approved a plan for resoiling and re-vegetating disturbed areas, with reclamation to be completed by 2031. Omya has not yet submitted a Reclamation Plan to San Bernardino County for the approved expansion.

Omya's White Knob Quarry is outside and west of the critical habitat area and is not addressed further in this analysis. In addition, reclamation activities have been completed or are underway at four areas with historical mining activity in the vicinity of the critical habitat area (Cloudy and Butterfield 3 quarries, Butterfield 2 deposit, and Butterfield 4 site).

Specialty Minerals, Inc.

SMI (formerly Pfizer, Inc.) currently extracts limestone from three quarries which it transports to its plant south of Lucerne Valley for processing. SMI holds rights on 68 claims, 43 unpatented claims on SBNF land, and 25 patented claims, covering approximately 1,360 acres. Current operations include the Marble Canyon, Arctic Canyon, and Cushenbury Quarries, which operate by right of one patented claim that SMI leases from the Cushenbury Mine Trust (CMT) as well as unpatented claims on SBNF land.

The Marble Canyon deposit covers 220 acres, includes one unpatented (CMT) and two unpatented claims (SBNF), and has been mined continuously since 1948. This deposit is expected to be mined through 2012, during which time 23 million tons of limestone ore (50 percent from SBNF land) and 9 million tons of waste rock (20 percent from SBNF land) are expected to be produced. A Reclamation Plan for mining activities at Arctic Canyon and Cushenbury quarries was approved in 1996, which included disturbance of 127 acres, overburden piles on 255 acres, and new road construction on 48 acres. The proposed quarries were expected to generate 57 million tons of limestone ore and 76 million tons of waste rock over 60 years of operation. Reclamation is expected to be completed by 2056, and includes mitigation (conservation set aside) of undisturbed acres reclamation of disturbed acres, resoiling, establishment of a plant nursery, and re-vegetation.

Rightstar Calcite

Rightstar Calcite is a mining corporation that leases or holds 17 placer claims in the vicinity of the critical habitat area, covering approximately 2,000 acres. Rightstar is currently refining engineering data in support of a proposal for an underground limestone mining operation (Smart Ranch) just east of Highway 18 approximately midway between Big Bear City and Mitsubishi's Cushenbury plant. Company representatives indicate that mining activities are anticipated to begin in Fall 2002, and to generate approximately five million tons of food and pharmaceutical grade GCC over an estimated 40-year time frame. No surface mining activities are proposed, although construction of the underground mine portal and associated infrastructure are anticipated to disturb approximately 3 acres of currently undisturbed carbonate plant habitat. Rightstar is in the process of applying for an SBNF permit, and has not submitted a PoO. Due to the limited nature of surface disturbance, company representatives do not anticipate the need to prepare an Environmental Impact Statement under NEPA.

ECONOMIC IMPACT OF CRITICAL HABITAT DESIGNATION

This analysis assumes that mining operations will be allowed to continue within some portion of critical habitat areas even though individual carbonate plants and essential carbonate plant habitat may be damaged or destroyed. This assumption is based in part on preliminary discussions that took place as part of the ongoing CHMS process, which indicate that certain areas within the proposed critical habitat boundaries may be open for future mining. If a Federal nexus exists, the Federal action agency, with the mining entities as applicants, would be required to consult with the Service on a project-specific basis before mining can take place in the proposed critical habitat. The Service would have to conclude that the project will not jeopardize the continued existence of the species or adversely modify critical habitat, or if jeopardy or adverse modification is likely, recommend Reasonable and Prudent Alternatives (RPAs). The assumptions made in this document regarding future mining in areas proposed as critical habitat represent an approximation based on available data sources; they do not represent agreements, opinions or decisions made by the Service, which can only be made based on specific project proposals and in the context of section 7 consultations.

Although future mining activities will take place within designated critical habitat, it is likely that, at some point, future mining activities in areas proposed as carbonate plant critical habitat may no longer be possible due to the additive effects of historical activity. In particular, limestone mining is an activity that inherently alters native plant habitat because ground disturbance is unavoidable and because the carbonate plants specifically thrive on the very substrates that are considered the most economically viable for mining. To date, no known RPAs have been identified that would allow mining to continue at a given location while simultaneously preserving the underlying plant populations and/or habitat. In this sense, long-term limestone mining is considered incompatible with preserving undisturbed carbonate plant habitat. Based on these assumptions, this analysis identifies three categories of land use impacts:

1. **Consultations and Project Modifications:** Mining activities with a Federal nexus proposed in designated critical habitat area would require individual section 7 consultations to proceed. Based on the result of these consultations, project proposals may need to incorporate modifications to avoid adverse modification and/or jeopardy by the proposed operations on carbonate plants and their critical habitat. The consultation and the associated project modifications may result in additional costs above those incurred due to baseline regulations.

2. **Reduced Future Mining Activity**: During consultations, the Service may recommend that mining operations in some areas not be allowed at all given their potential to adversely modify critical habitat and/or jeopardize the long-term survival of carbonate plant species. These recommendations would most likely come in the form of jeopardy and/or adverse modification biological opinions with no RPAs. The combined effect of such recommendations may reduce mining activity in the San Bernardino mountains relative to what would have otherwise occurred. The economic costs of reduced future mining activity are based on the estimated present value of mining output foregone due to section 7 consultations, as well as the administrative costs of the consultations themselves.

3. **No Impact on Future Mining Activity**: A large portion of the critical habitat designation is not suitable for mining, either because the land does not contain valuable limestone deposits or because extraction of these deposits is not economically viable. For example, lower grade limestone deposits located long distances from existing road or rail networks are not likely to be competitive due to the high costs of transportation. For these areas, mining related economic impacts associated with section 7 are unlikely, because mining would not have occurred in any case.

The number of future section 7 consultations in each of the first two categories above was estimated using historical consultation rates as well as assumptions based on the best available information. According to Service records, there were seven section 7 consultations between 1994, when the carbonate plants were Federally listed, and 2001, resulting in an approximate average of one consultation per year. While the majority of these consultations did not involve mining activities, this analysis conservatively assumes that 50 percent of future section 7 consultations will be mining related. Based on the average rate of one consultation per year, this analysis assumes that ten (10) mining-related section 7 consultations will take place in the next 20 years. As discussed below, five (5) of these are assumed to result in Jeopardy Biological Opinions with no RPAs, and five (5) are assumed to result in non-Jeopardy Biological Opinions with project modifications.

At this time, the Service is unable to specify the location or proportion of land within critical habitat that is likely to fall into the three categories described above. This analysis relies on information contained in CHMS documents and additional Forest Service and BLM data to estimate the number of acres included in each of the above categories.[14] Whenever possible, this analysis specifies whether a given cost estimate is attributable to both the designation of critical habitat and section 7 protections associated with the listing (co-extensive costs), or whether costs are attributable solely to the designation of critical habitat. The analysis is described further below.

CONSULTATIONS AND PROJECT MODIFICATIONS

As mentioned above, this analysis assumes that some future mining activities will occur within the proposed critical habitat area. For such projects to proceed, the Service would have to conclude through section 7 consultations that the proposed activities would not adversely modify critical habitat and/or jeopardize the continued existence of the species. Although such projects may be allowed to move forward, this analysis assumes that applicants would implement project modifications developed during the consultation process, thus providing a degree of species protection greater than that required by "baseline" mining regulations. In such cases, the "with section 7" scenario includes costs associated with

[14]While activities on private lands (e.g., patented mining claims) are not subject to section 7 consultation, the Service has indicated that disturbance of carbonate plant habitat on private lands will be taken into account when evaluating the additive effect of historical mining activities on the species as a whole, and may increase the likelihood of future jeopardy and/or adverse modification opinions on lands that are subject to section 7 consultation.

developing and implementing the project modifications. However, costs due to operational and reclamation standards required under SMARA, CEQA, and Forest Service and BLM regulations are part of the regulatory baseline as discussed at the beginning of this chapter, and are not included in the economic cost estimate.

In February 2002 the SBNF approved a PoO submitted by Omya for expansion of its Sentinel Quarry onto SBNF land. The approval followed a Finding of No Significant Impact (FONSI) of the proposed expansion, as analyzed in the associated NEPA-mandated Environmental Assessment. The approval also followed an informal section 7 consultation with the Service, and depended in part upon project modifications negotiated during the consultation process. Omya voluntarily modified its original expansion plan by reconfiguring an overburden pile to avoid sensitive carbonate plant habitat. Omya also agreed to develop a Dust Management Plan (DMP) to reduce fugitive dust exposure to adjacent plant populations and to provide for biological monitoring of potentially exposed populations.

Omya estimates that the cost to install real-time dust monitoring equipment is approximately $10,000, and the annual cost of biological monitoring is approximately $5,000. Dust monitoring is required until sufficient data has been generated to determine that fugitive dust poses no adverse effects to carbonate plant populations. Omya estimates that the cost to reconfigure the overburden pile will be negligible, as relatively small adjustments will be required to avoid plant habitat.[15] Finally, although a Reclamation Plan has not yet been submitted to San Bernardino County for approval, this analysis assumes that additional reclamation measures will not be required above those specified in the FONSI.[16]

The Omya data represents the only available cost estimate for section 7 project modifications associated with mining activities in the Big Bear area. As a result, this analysis assumes that all future mining-related section 7 consultations in the critical habitat area will incur similar project modification costs to those required for the Sentinel Quarry expansion. Based on historical consultation rates as discussed above, this analysis assumes that five (5) formal section 7 consultations will be required in the next 20 years as mining companies seek to expand operations, and that these consultations will occur in years 1, 5, 10, 15, and 20.[17] The low estimate for project modifications assumes that dust monitoring will continue for five years, while the high estimate assumes that dust monitoring will continue for ten years following each consultation. As shown in **Table A-1**, the total estimated cost of project modifications ranges from approximately $83,000 to $124,000, assuming a discount rate of 7 percent, and the cost of the associated section 7 consultations is estimated to range from approximately $78,000 to $133,000. Consultation cost calculations and a description of the consultation cost model are presented in **Appendix B**. Because Omya was required to consult prior to the designation of critical habitat, and

[15] The presence of non-carbonate substrate in the vicinity of the proposed overburden pad allowed reconfiguration at minimal additional expense. It should be noted, however, that if site conditions had required relocation of the overburden pad (as they could for future proposed projects), Omya estimates the associated costs would have halted the project due to extremely high transportation costs.

[16] Based on personal communication with Senior Associate Planner, San Bernardino Planning Department. May 28, 2002.

[17] It should be noted that if the CHMS were to be approved, the SBNF and BLM would be required to participate in a formal programmatic section 7 consultation with the Service to ensure that the negotiated management strategies were in compliance with the Act. In this case, the programmatic consultation would replace the ten individual section 7 consultations assumed in this analysis.

because the mining industry is already aware of the presence of the carbonate plants as a result of the CHMS process, the estimated consultation and project modification costs are assumed to be attributable co-extensively to the listing.

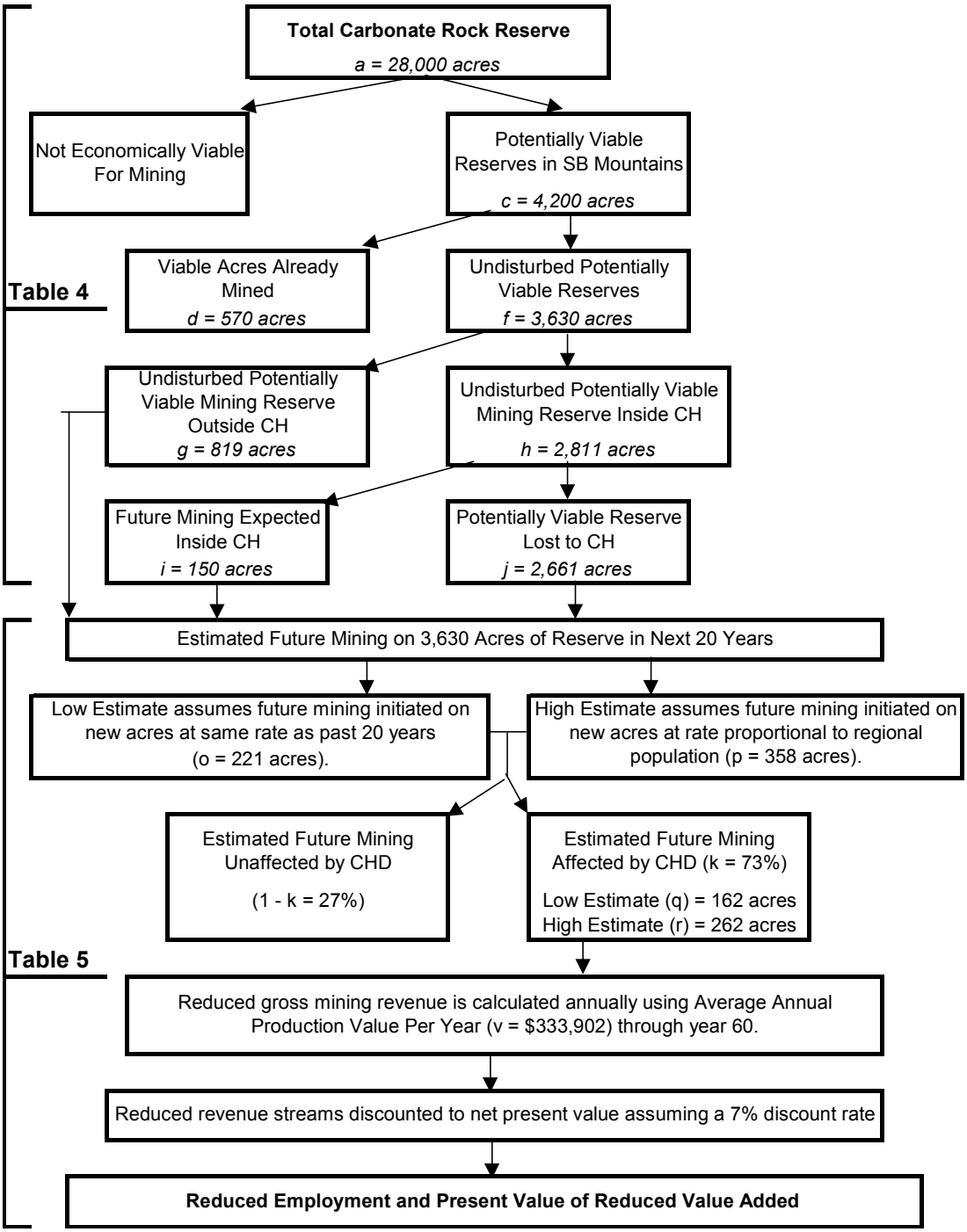
This analysis also assumes that mining companies will propose future activities that result in five (5) additional formal consultations in the next 20 years that will result in jeopardy and/or adverse modification biological opinions.[17] Because mining activities irreversibly alter underlying native plant habitat, and because the carbonate plants occupy many areas that would otherwise be considered economically viable for mining, this analysis assumes that no RPAs will be identified during these consultations that are both consistent with the intended purpose of the proposed activity and avoid jeopardizing the species or adversely modifying critical habitat. The economic cost of the proposed mining activities that would no longer be permitted to occur as a result of these section 7 consultations is estimated in the following section of this report. The administrative cost of the consultations themselves are estimated to range from approximately $78,000 to $133,000 (see **Appendix B**). These costs would be borne by the mining companies, the action agency (SBNF or BLM), and the Service, and are considered to be attributable co-extensively to the listing because (1) any future mining operations are expected to be large enough in scope that they are assumed to include or affect occupied carbonate plant habitat, and (2) the mining industry, SBNF, and BLM is already aware of the presence of the carbonate plants as a result of the CHMS process, their Federal listing, and their status as Forest Service special-status species.

REDUCED MINING ACTIVITY

To estimate the economic impact of reduced mining activity within proposed critical habitat, research was conducted on the amount, location, and value of the limestone resource within the Big Bear area. As part of this effort, mining experts and biologists from the Service, SBNF, BLM, and local mining companies as well as mining claim holders were interviewed. Information contained in published and draft studies, research documents, and professional publications related to the topic were also reviewed. Specific citations are provided below for the assumptions and data used in the economic impact calculations. These assumptions are based on the best information available at the time of publication. It is recognized that some of these assumptions may contain a high level of uncertainty due to the dynamic nature of the local mining industry and the lack of precise data on the amount, location, and quality of "in-ground" limestone deposits.

The overall framework for evaluating the economic cost associated with reduced mining is summarized in the flow-chart provided in **Figure 3**. As shown, the calculations begin with an estimate of the amount of potentially economically viable carbonate rock reserves in the Big Bear area that may be affected by proposed critical habitat. This estimate is adjusted to account for (1) acres already mined, (2) acres outside critical habitat, and (3) estimated mining acres allowed inside critical habitat.

Figure 3
Flow Chart of Mining Impact Methodology



The analysis then estimates the future mining industry revenues generated by mining that would have commenced over the next 20 years within proposed critical habitat. Because the active life of any particular mine or quarry is assumed to be 40 years, the total time horizon for this analysis is 60 years (the income from a mining operation that begins in year 20 is evaluated for 40 years). The stream of future income that would have been generated from mining activity in proposed critical habitat over the 60 year period is converted to a "present value" based on a discount rate of 7 percent.[18]

Ultimately, the reduced mining revenue within proposed critical habitat is used to derive an estimate of reduced "value added" and direct employment. Reduced direct employment represents an estimate of the lost jobs in the mining sector due to the reduced mining activity in proposed critical habitat. "Value added" equals the production value or sale price of total mining output minus the costs of the goods and services used to create this output. "Value added" also equals the sum of all employee compensation, property and proprietor income, and indirect business taxes. Value added is an established economic concept used to measure the contribution of a particular sector or commercial activity to the overall economy. It is preferable to gross output, which also includes the costs of inputs produced by other firms that supply the mining industry with goods and services. Given that the mining industry represents less than 0.12 percent of the overall San Bernardino economy (**Table 3**), and that much of the industry's inputs are produced for a national market, the reduced demand for these inputs is not anticipated to have a measurable economic impact and is not quantified as a part of this analysis.

Assumptions and Calculations

The data and analytical assumptions used to estimate the values described above are summarized in **Table 4** and **Table 5. Table 4** focuses on measuring the total supply of potentially economically viable carbonate reserve in the Big Bear area and the portion of this supply that is located in proposed critical habitat. **Table 5** focuses on estimating future demand, or the number of new quarry acres in the Big Bear area in which mining activities will be initiated over the next 20 years, as well as the proportion of future mining that would otherwise have occurred in proposed critical habitat. Further explanation of the specific data estimates contained in **Table 4** and **Table 5** is provided below. In the tables and the following text, "CH" refers to "critical habitat."

[18] Present Value equals the value today from an income stream received over a given time period. A discount rate is a measure used to convert future income into present value. The discount rate of 7 percent used in this analysis is based on US Office of Management and Budget (OMB) guidelines for an analysis of this type.

Table 4
Assumptions for Acres of Economically Viable Reserve In Critical Habitat
Economic Analysis of Proposed Carbonate Plant Critical Habitat Designation

Item	Amount (rounded #s)		Formula	Source
Total Carbonate Rock Reserve (1)	28,000	acres	*a*	Sentinel Quarry Expansion EA and SBNF Biological Assessment, February 1999
% of Reserve Feasibly Mined	15%		*b*	Sentinel Quarry Expansion EA
Total Potentially Viable Carbonate Reserve in San Bernardino Mountains	4,200	acres	$c = a * b$	Calculated value
Viable Acres Already Mined (2)				
Disturbed Prior to 1974	260		d_1	SBNF Biological Assessment (Feb. 1999)
Disturbed After 1974	310		$d_2 = d_3 - d_1$	Calculated value
Total	570		d_3	Forest Service estimates from aerial photo
Avg. New Mining Acres Per Year Since 1974	11.1	acres/year	$e = d_2 / (28 \text{ years})$	
Undisturbed Potentially Viable Reserve	3,630	acres	$f = c - d_3$	Calculated value
Undisturbed Potentially Viable Reserve Outside CH (3)	819	acres	*g*	Based on historical data and CHMS documents (3)
Undisturbed Potentially Viable Reserve in CH	2,811	acres	$h = f - g$	Calculated value
Future Mining Expected in CH (3)	150	acres	*i*	EPS assumption based on CHMS documents (3)
Potentially Viable Reserve Lost to CH (4)	2,661	acres	$j = h - i$	Calculated value
Lost Potentially Viable Reserve as a % of Total	73%		$k = j / f$	Calculated value

(1) Amount in San Bernardino Mountain area that encompasses the critical habitat designations.
(2) Includes active and inactive quarry acreage. An additional 1,032 disturbed acres were identified, associated with overburden, facilities, etc..
(3) EPS assumption based on draft maps developed as part of ongoing Carbonate Habitat Management Strategy (CHMS) negotiations.
(4) While these acres may contain economically viable reserves, not all may be viably mined within a 20 year timeframe.

Table 5
Assumptions for Calculation of Reduced Mining Value in Critical Habitat
Economic Analysis of Proposed Carbonate Plant Critical Habitat Designation

Item	Amount (rounded #s)		Formula	Source
Active Mining Acres in 2002	410	acres	*l*	Forest Service estimates from aerial photo
Current Active Acres Still Available By 2023 (1)	221	acres	$m = d_2 - e * (1983 - 1974)$	Calculated value
Future Mining "High" and "Low" Estimating Factors				
Low Estimate: Based on Avg. New Mining Acres / Year	11.1	acres / year	*e*	See Table 4
High Estimate: Based on Active Mining / 10,000 in Regional Population (2)	0.21	acres / 10,000 pop.	*n = l / (pop. in 2000) / 10,000*	2000 population of 19,329,839 per US Census.
Estimated Future Mining in Next 20 Years (by 2023)				
Low Estimate	221	acres	*o = e * (20 years)*	Calculated value
High Estimate	358	acres	*p = [n * (pop. in 2023) / 10,000] - m*	2023 population of 27,308,079 per SCAG projections (2)
Estimated Future Mining Affected by CH Designation				
Low Estimate	162	acres	*q = o * k*	Calculated value
High Estimate	262	acres	*r = p * k*	Calculated value
Financial Calculation Assumptions				
Big Bear Annual production of Portland Cement in 2000	1,700,000			Cal. Portland Cement Promotion Council
Big Bear Annual production of GCC in 2000	2,000,000			Mining companies in-house data (3)
Total	3,700,000	tons	*s = r / l*	Calculated value
40-year Avg. Annual Tons per acre	9,024	tons / acre	*t = s / l*	Calculated value
Average Price per Ton	$37.00	per ton	*u*	Mining companies in-house data (3)
40-year Avg. Annual Gross Production Value per Acre	$333,902		*v = u / t*	Calculated value
Assumed Discount Rate	7%			OMB Guidelines

(1) Given the assumed 40-year active life of a quarry, mining commenced on land after 1982 will still be active in 2023.
(2) Regional population includes Riverside, San Bernardino, Imperial, San Diego, Orange, Los Angeles, Anahiem, Los Angeles, and Ventura counties.
(3) GCC data includes SMI and Omya production as reported in *Economic Impact of Proposed Designation of Critical Habitat for Five Carbonate Plants from the San Bernardino Mountains in Southern California* , prepared by Edward Jucevic, 12 April 2002. Aggregate price data is from the same source.

Supply of Economically Viable Reserves (Table 4)

- **Total Potentially Viable Carbonate Reserves in San Bernardino Mountains:** This assumption refers to the total acres of the limestone deposits in the Big Bear area for which mining operations would be economically viable (see "General Mining Regulation Background" section in this chapter for a discussion of economic viability). It is based on information provided in the *Environmental Assessment for Sentinel Quarry Expansion* published by the SBNF in February 2002. According to this document, approximately 15 percent, or 4,500 acres, of limestone deposits meet this criteria. The remaining 23,800 acres in the Big Bear area that contain carbonate reserves, or approximately 85 percent of the total, are not considered economically viable due to such factors as location, accessibility, cost of extraction, and quality of the deposit. [19]

- **Viable Acres Already Mined:** This assumption refers to the number of viable mining acres in the Big Bear area in which mining activities have already been initiated. According to Forest Service aerial photographs, about 570 acres have been mined, or "disturbed," to date. This amount includes both active and inactive quarries. In addition, according to the SBNF's *Biological Assessment for Carbonate Endemic Plants* dated February 1999, approximately 260 of these acres were "disturbed" prior to 1974. Thus, the remaining 310 acres were disturbed between 1974 and 2002, which equates to an average disturbance rate of approximately 11.1 acres per year.

- **Undisturbed Potentially Viable Supply:** This calculation refers to the amount of economically viable limestone deposit in the Big Bear area for which mining operations have not yet been initiated. Thus, there are an estimated 3,630 acres of undisturbed limestone deposits that are potentially economically viable.

- **Undisturbed Potentially Viable Reserve Outside CH:** This assumption provides an estimate of the total undisturbed reserve acres in the Big Bear area that are considered economically viable and that are located outside the proposed critical habitat boundaries. This estimate is based on a draft map developed as part of the on-going CHMS process. Although this number has not yet been finalized, it represents the best estimate currently available of the acreage outside proposed critical habitat boundaries that is potentially viable for mining. This estimate of 819 acres subtracted from the total undisturbed supply of 3,630 acres equals 2,811 acres of potentially viable limestone deposits that are inside proposed critical habitat boundaries ("Undisturbed Potentially Viable Reserve in CH").

- **Future Mining In Critical Habitat.** This assumption represents an estimate of the potentially viable reserve acres within proposed critical habitat where future mining is anticipated. This 150-acre estimate is based on a calculation of the acres of overlap between areas designated as open for

[19] All of the estimates included in **Table 4** and **Table 5** refer to net mining acres only and exclude the land necessary for the infrastructure used in mining operations, such as haul roads, required structures, settlement ponds, spoils, and other un-mined areas.

future mining in the draft CHMS map and the proposed critical habitat boundaries.[20] This number is an estimate that has not been finalized and does not represent any agreements, opinions, or decisions made by the Service. Overall, the draft CHMS map estimates 969 potentially viable acres available for future mining both inside and outside proposed critical habitat, which represents about 27 percent of the total undisturbed potentially viable reserve. By way of comparison, the total number of acres mined in the Big Bear area to date (approximately 570 acres since the early 1900's) represents less than 59 percent of this potentially viable future supply.

- **Potentially Viable Reserve Lost to Section 7.** This estimate refers to the number of potentially viable reserve acres within proposed critical habitat that are likely to be off-limits to future mining. The 2,661 estimate is calculated by subtracting "Future Mining In CH" (150 acres) from the estimated total "Undisturbed Potentially Viable Reserve in CH" (2,811 acres), as defined above. As shown, the potentially viable reserves lost due to section 7 consultations represents about 73 percent of the total undisturbed potentially viable reserve. Again, it is important to note that this estimate is based on information developed for the on-going CHMS process and does not represent any agreements, opinions, or decisions made by the Service. Although the estimated 2,661 acres may contain economically viable reserves, not all would have been viably mined within the next 20 years. Table 5 provides a set of assumptions and calculations designed to provide a high and low estimate of the proportion of these 2,661 acres that would actually have been mined in the next 20 years but for the proposed critical habitat designation.

Future Mining Affected by Critical Habitat (Table 5)

- **Active Mining Acres in 2002:** This number represents the estimated acres of active quarries in the Big Bear area in 2002. It is based on information provided by the SBNF that was derived from Geographic Information Systems (GIS) calculations of aerial photographs. The estimated 410 acres of active mining includes recently opened quarries as well as those in other stages of their 40-year "life-cycles."

- **Current Active Acres Still Available by 2023:** This calculation provides the estimated number of currently active mining acres that will still be in operation with the next 20 years. Given the assumed 40-year active life of a quarry, mining commenced on land after 1982 will still be active in 2023. The estimated 221acres still active as of 2023 is equal to the number of active acres after 1974 (310 acres) minus the number of acres mined per year from 1974 to 1982 (11.1 acres per year times 8 years, or 89 acres).

[20] Areas designated as open for future mining correspond to the data layer "BCX" in the Draft CHMS map published on February 26, 2002. These preliminary negotiated boundaries are intended to maximize the amount of viable limestone reserve available for future mining while simultaneously protecting essential carbonate plant populations and habitat. The area of overlap between the BCX data layer and the proposed critical habitat boundaries represents the most accurate approximation at the time of this analysis of the likely extent of future mining that will be allowed following the designation of critical habitat.

- **Estimated Future Mining in Next 20 Years (Low Estimate):** This calculation provides a "Low Estimate" of currently undisturbed acres that will experience new mining activity in the next 20 years. This is a demand-based estimate of the number of acres that will be mined in 20 years, irrespective of the designation of critical habitat. It assumes that the rate of future mining activity (number of acres per year) will be proportional to the rate of historical mining activity. Specifically, assuming 11.1 acres per year (as described above and calculated in Table 4), the low-estimate assumes there will be 221 new acres mined over the next 20 years (or by 2023).

- **Estimated Future Mining in Next 20 Years (High Estimate):** This calculation provides a "High Estimate" of currently undisturbed acres that will experience new mining activity in the next 20 years. This also is a demand-based estimate of the number of acres that will be mined in 20 years, irrespective of the designation of critical habitat. The High-Estimate is based on the relationship between total regional population and the acres of existing active mining operations. It assumes that the number of future "acres mined per 10,000 in regional population" will be proportional to the number of existing "acres mined per 10,000 in regional population." Specifically, the ratio of 0.21 acres per 10,000 population is calculated by dividing the year 2000 population in 10,000s (19,329,839/10,000) by the number of active mining acres (410). This ratio is multiplied by the projected 2023 regional population in 10,000s (27,308,079/10,000) to calculate the total number of active acres in 2023. Finally, the number of "Current Active Acres Still Available By 2023"(221 acres) is subtracted to reach the estimated number of net "new" acres required in the next 20 years (358 acres).

- **Estimated Future Mining Affected by CH Designation:** This calculation multiplies both the High and Low Estimates of total new mining by 2023 by 73 percent, or the assumed proportion of the total viable reserve lost that is within proposed critical habitat, as estimated in Table 4. The calculation provides an estimate of the total number of new mining acres within proposed critical habitat that may be off-limits to mining. As shown, section 7 consultations may result in between 162 and 270 fewer acres of reserve mined over the next 20 years. It is important to note that this approach assumes that all of the 3,630 acres of undisturbed, potentially viable reserve are identical with respect to economic viability. Realistically, certain reserve acres would be more likely to be considered economically viable than others based on likely reserve quality, depth, distance from infrastructure, and other factors. However, this analysis does not make any such differentiations due to a lack of location-specific data. This issue is discussed further below.

- **Financial Calculation Assumptions:** These assumptions are used to calculate a present value of the acres lost due to section 7 consultations. More detailed time-series calculations for both the High Estimate and Low Estimate are provided in Appendix Table A-2 and Table A-3, respectively. A key estimate is the "40-year average annual gross production value per acre," calculated at about $334,000.[21] This amount is multiplied by the number of acres lost per year to obtain an income

[21] It is recognized that in practice the economic value of mining reserves is extremely location-specific, and the single estimate of production value per-acre is not expected to accurately characterize any particular reserve acre in the Big Bear area. This estimate is based on the total production value in a given year and the total number of active acres that produced the corresponding product. In the absence of detailed site-specific data that would enable a location-by-location estimate of

stream of reduced future earnings. Again, the calculation assumes a 40 year active life of each new mining acre with future reduced earnings converted to a present value based on an annual discount rate of 7 percent.

Key Results: Estimated Economic Costs

An estimate of the present value of potentially reduced mining activity in proposed critical habitat Unit 1 is provided in **Table 6**, and is based on the assumptions described above. As shown, the section 7 impacts are estimated to result in a loss of between 142 and 230 full-time mining-related jobs in San Bernardino County over the next 20 years (the average job loss over 20 years). In addition, the present value of reduced "value added" is estimated to range from $173 million to $280 million over a 60-year period. As described earlier, "value added" equals the production value or sale price of total mining output minus the costs of the goods and services used to create this output. It also equals the sum of all employee compensation, property and proprietor income, and indirect business taxes. These estimates are derived from data provided by Implan Group, Inc. of direct employment and value added per million dollars of sales in the San Bernardino County mining industry.[22]

A comparison of the estimated economic impact of section 7 on future mining with mining activity anticipated to occur in the absence of section 7 is provided in **Table 7**. As shown, the reduced production due to section 7 represents between 16 and 30 percent of total production anticipated to occur in the absence of section 7-related impacts. Overall, the proposed critical habitat area would have generated an estimated 59 to 95 million tons of mining product.

In general the estimates provided in this analysis embody a number of "worst-case scenario" assumptions that may exaggerate the impact of proposed critical habitat on future mining. The two most important issues in this regard are discussed below:

- **Preferable Mining Opportunities Outside Proposed Critical Habitat:** As mentioned above, this analysis treats all of the estimated 3,630 acres of potentially viable reserves as equal. Consequently, the estimates provided above assume that mining companies would have initiated mining activities in areas proposed as critical habitat 73 percent of the time. In reality, future mining is more likely to expand in a relatively concentric manner around existing mining operations, due primarily to the availability of required infrastructure (e.g. transportation and processing facilities).

value per-acre (information that mining companies guard closely), this value represents an average, and includes individual acres mined at various stages of their 40-year life-cycle. As such, it represents the most accurate estimate possible given available information.

[22] Minnesota IMPLAN Group, Inc. Stillwater, Minnesota.

Table 6
Present Value Calculation from Potential Reduced Mining in Critical Habitat Area
Economic Analysis of Proposed Carbonate Plant Critical Habitat Designation

Economic Category	Present Value Calculation (1)	
	Low Estimate	***High Estimate***
Potential Reduced Property Income (2)	$47,749,215	$77,155,649
Potential Reduced Employee Compensation (3)	$96,461,377	$155,867,276
Potential Reduced Proprietor Income (4)	$10,276,938	$16,606,007
Potential Reduced Indirect Bus. Taxes (5)	$18,733,244	$30,270,143
Potential Reduced Value Added (6)	$173,220,773	$279,899,075
Annualized Value of Reduced Value Added (7)	$12,338,382	$19,936,994
20-year Potential Avg. Annual Employment Reduction	142	230

(1) Represents potential present value from foregone mining output as calculated in Appendix **Table A-2** and Table A-3, assuming a 7% discount rate. The Low Estimate assumes that mining would have been initiated on 162 acres of critical habitat land in 20 years compared to 358 for the High Estimate scenario.
(2) Represents payments for interest, rents, royalties, dividends, and profits.
(3) Represents wage and salary payments to mining workers, including benefits.
(4) Represents payments received by self-employed individuals, including private business owners.
(5) Represents excise and sales taxes paid to businesses. Excludes taxes on profit or income.
(6) Represents the sum of the preceeding four economic measures.
(7) Represents the annual amount that is equivalent to the present value of reduced value added.

Table 7
Comparison of Potential Economic Impact of Section 7
Economic Analysis of Proposed Carbonate Plant Critical Habitat Designation

Economic Category	*Low Estimate*	*High Estimate*	*Formula*
Mining Production Without Section 7 (1)			*A*
Value Added	$1,058,280,566	$945,379,438	
Mining Tons	322,912,021	224,447,548	
Reduced Mining Production Due To Section 7 (2)			*B*
Value Added	$173,220,773	$279,899,075	
Mining Tons	58,601,779	94,691,782	
Mining Production With Section 7 (3)			*C = A - B*
Value Added	$885,059,792	$665,480,363	
Mining Tons	264,310,242	129,755,765	
Reduced Mining Production as Percent of Total Mining Production Without Section 7	16%	30%	*D = B / A*

(1) An estimate of the total tons and value added anticipated without section 7 from mining on both existing and new acres commenced within the next 20 years.
(2) See estimate calculated in Table 6.
(3) An estimate of the total tons and value added anticipated with section 7 from mining on both existing and new acres commenced within the next 20 years.

In addition, viable mining opportunities exist that will not be affected by proposed critical habitat on more than 969 acres in the Big Bear area (Table 4). This available acreage represents about 165 percent of future mining activity estimated over the next 20 years under the High Estimate scenario (and 442 percent under the Low Estimate scenario). More importantly, the vast majority of this 969 acres, which includes an estimated 150 acres of mining expected to occur inside proposed critical habitat boundaries, is located in close proximity to existing mining operations. Thus, there is a strong probability that a large proportion of future mining would have occurred in areas outside proposed critical habitat even in the absence of the listing or proposed designation.

- **Economic Losses Off-set by Gains Elsewhere:** It is likely that some or all of the reduced employment and value added estimates described above would be off-set by increased production at other mines and/or sectors of the economy. Given the highly competitive nature of the mining industry, restricted mining in one location often provides a market opportunity for increased mining in other locations. In addition, employees of the firms potentially affected by proposed critical habitat would likely be re-employed by other sectors, or hired by other mining companies. By way of example, if all of the employee compensation shown in Table 6 is merely shifted to other mining operations and/or sectors of the economy, the total economic impact could reduce to between $77 million for the Low Estimate to $124 million for the High Estimate.[23] It is also important to note that the potential reduction in property and proprietor income or profit would be incurred primarily by Omya, Mitsubishi, and Specialty Minerals, all of which are national and international companies. Thus, these losses would not be limited to San Bernardino County.

In addition to the two factors described above, the costs estimated in this analysis are likely to be significantly affected by the outcome of the ongoing CHMS process. As described earlier, preliminary indications suggest that the CHMS may result in the adoption of management guidelines that would restrict future mining within the proposed critical habitat area. While the Federal listing of the carbonate plants, and the regulatory regime that accompanies such a listing, may have contributed in part to the driving force behind development of the CHMS, it is unlikely that the anticipation of critical habitat designation was a significant component of this impetus. This observation is supported by the fact that (1) the CHMS was initiated well before the California Native Plant Society filed the suit that ultimately required the Service to designate critical habitat for the carbonate plants, and (2) that participants in the CHMS have indicated that the primary driving force was clearly the listing rather than the designation of critical habitat, which was actually an unforeseen development that occurred in the process of negotiations. In this sense, although some fraction of the restrictions to mining, and of the resulting economic costs, associated with the CHMS could potentially be considered co-extensive with the listing, it is unlikely that any of them would be considered solely due to the designation of critical habitat. In either case, the fact that the CHMS has not been formally adopted as of the date of publication of this analysis makes this determination irrelevant, and precludes consideration of the CHMS as a baseline regulation.

[23] In reality, value added per employee may be slightly lower given that the new jobs may represent the "next best" employment opportunity.

Due to the factors described above, the actual impact of section 7 on mining may be much smaller than the number estimated herein. In addition, the entire costs described above are considered to be attributable co-extensively to the listing because (1) mining operations are large enough in scope that they are expected to include occupied habitat areas, and (2) the SBNF, BLM, and the mining industry are aware of the presence of the plants as a result of the CHMS process, their Federal listing, and their status as Forest Service special-status species.

IV. IMPACT OF DESIGNATION ON OTHER LAND USES

This chapter evaluates the economic impact of activities other than mining that are potentially affected by the proposed designation of critical habitat. The discussion includes a description of the activity, how the activity would be affected, and a calculation of the associated costs due to section 7. A consultation cost model and summary tables are provided in Appendix B.

FIRE MANAGEMENT

Current and future fire management is one of the primary responsibilities of the SBNF. Fire management generally falls into two categories -- suppression and prevention. Fire suppression is an emergency response to wildfire, the frequency and extent of which is difficult to forecast. When a wildfire poses an imminent threat to human life and property -- which is almost always the case for wildfires in the San Bernardino mountains -- fire suppression activities are subject to emergency consultation rules under section 7. According to SBNF personnel, emergency consultations associated with fire are not expected to affect future activities or impose additional costs.[24]

Fire prevention activities include vegetation management and prescribed burns designed to cull unhealthy and dry vegetative cover that may pose fire risk. Fire prevention, including prescribed burns, will continue to be undertaken by the SBNF in all three critical habitat units. Each prescribed burn in a critical habitat area is subject to an individual formal section 7 consultation. According to estimates by SBNF personnel based on historical activity, approximately six such consultations are expected to be required in the next twenty years.[25] As shown in **Appendix Table B-4**, total administrative costs are estimated to range from $66,000 to $109,200.

Because the scope of activities likely to be covered by any single consultation are so extensive (e.g., large, linear ridge-top fire cuts) and are potentially destructive in nature, they are expected to include or impact occupied carbonate plant habitat. Therefore, it is assumed that the SBNF would likely have consulted in the absence of the critical habitat, so the associated costs are considered to be attributable co-extensively to the listing.

RECREATIONAL SPECIAL USE PERMITS

The SBNF anticipates that it will continue to issue SUPs for organized recreational events within the National Forest, including those within critical habitat areas. SUPs are required for activities such as organized running and mountain bike competitions on Forest Service roads and trails. These types of

[24] Personal communication with Mountaintop District Botanist, San Bernardino National Forest, on April 14, 2002.

[25] Ibid.

activities are typically limited to existing road and trail networks, and are thus deemed to pose a limited threat to critical habitat and to existing carbonate plants. Such activities have been permitted in the past and will likely continue to be permitted in the future. The critical habitat units most likely to be affected by activities requiring recreational SUPs are the Bertha Ridge Unit (Unit 2) and the Sugarlump Ridge Unit (Unit 3). These units are closer to Big Bear City, which is typically the "hub" for tourist activities and recreational events, and these units also contain less commercial mining activity that might impede cross-country events.

Forest Service personnel estimate that one programmatic consultation will be required in order to establish a policy for the issuance of future recreational SUPs in proposed carbonate plant critical habitat areas.[26] Once established, this policy will likely streamline the permit process for future applicants and for Forest Service personnel. This programmatic consultation is expected to occur in 2003 and to require approximately six months of one GS-11 staff member's time to prepare materials and to participate in the consultation process. Project-specific consultation cost estimates were used instead of cost model projections in this case because specific labor estimates were provided by the likely lead agency, and because programmatic consultations are generally more expensive and time consuming than the standard section 7 consultations upon which the cost model is based. The total estimated cost to the SBNF of the recreational SUP programmatic consultation is approximately $21,730, and includes the cost to prepare a Biological Assessment.[27] Assuming that the Service's level of effort in programmatic consultations is also greater than standard formal consultations, this figure was also used to estimate costs incurred by the Service, including the cost to prepare a Biological Opinion. The total cost of the recreational SUP programmatic consultation is therefore $43,460. This cost is assumed to be co-extensive with the listing, because Service and SBNF personnel have indicated that a programmatic section 7 consultation would likely have been initiated in the absence of the designation of critical habitat.[28]

Although the programmatic consultation is expected to streamline the SUP process, the SBNF will still need to obtain letters of concurrence from the Service for each SUP application in proposed critical habitat. SBNF personnel expect that applications can be "grouped"such that approximately three (3) letters from SBNF requesting concurrence and three (3) letters of concurrence from the Service will be required each year for twenty years. Service personnel indicate that although this process is essentially equivalent to an informal consultation, that the level of complexity and effort required is considerably lower than a standard informal consultation. This analysis assumes one informal consultation will be required per year for the next 20 years, estimating that one standard informal consultation approximates three streamlined informal consultations. The total administrative cost of the resulting 20 informal consultations is estimated to range from approximately $46,000 to $140,000 (**Appendix Table B-4**). Based on input from the Service and SBNF, this analysis assumes that 50 percent of the streamlined informal consultations will occur in areas occupied by the species, and the associated costs ($23,000 to $70,000) are thus attributable co-extensively to the listing. Because it is possible that some future SUPs might be sought in areas that do not contain occupied habitat, this analysis assumes that the remaining 50

[26] Personal communication with Mountaintop District Botanist, San Bernardino National Forest, on March 20, 2002.
[27] Hourly wage for a GS-11, step 5, multiplied by 960 hours (six months). Hourly wage from U.S. Office of Personnel Management, 2002 General Schedule, accessed at: http://www.opm.gov/oca/02tables/gscalcul.html on April 7, 2002.
[28] Personal communication with Mountaintop District Botanist, San Bernardino National Forest, on March 20, 2002.

percent of the costs are attributable solely to the designation of critical habitat.[29] This is believed to be a conservative estimate, which is more likely to overstate than understate the likely effects of the critical habitat designation.

GRAZING ON BLM LAND

Most of the land on and adjacent to the proposed critical habitat area is not well suited for cattle or other livestock grazing. In general, the rocky and steep terrain and arid climate in the San Bernardino mountains make cattle livestock grazing uneconomical. However, the BLM does maintain one grazing allotment, the Rattlesnake Canyon Allotment, which intersects a portion of the proposed critical habitat designation. Located on 27,823 acres in Rattlesnake Canyon area, approximately 10 miles east of Mitsubishi's Cushenbury plant, the Rattlesnake Canyon Allotment is currently permitted for grazing of 45 cows plus their calves. Approximately 250 acres of this allotment, or less than one percent, is proposed critical habitat for three carbonate plant species as part of Unit 1.

Based on a consultation with the Service prior to the proposed critical habitat designation, the BLM has agreed to build protective fencing around the occupied carbonate plant habitat in the Rattlesnake Canyon Allotment, which comprises approximately 250 acres. Costs associated with construction of the fencing and the resulting loss in grazing area are not considered in the analysis because they were negotiated prior to the proposed designation, and represent a baseline regulation. The designation of critical habitat is likely to result in one reinitiated consultation, however, which is not expected to result in any additional protective measures. As shown in **Appendix Table B-4**, the reinitiated consultation is expected to cost between $3,500 and $10,900, which is attributable solely to the proposed critical habitat designation.

Both the BLM and Forest Service are unaware of any pending or proposed grazing allotment applications that would overlap with the proposed critical habitat area. In addition, given that the lands on and adjacent to the proposed critical habitat area are not well suited for livestock grazing, no new grazing allotments are anticipated in the next twenty years. [30]

ROAD AND TRAIL CONSTRUCTION

Future road and trail construction proposed through carbonate plant critical habitat may be affected by the listing and/or designation. The U.S. Forest Service, for example, occasionally constructs roads and trails for recreational and land management purposes. In addition, the potential expansion or improvement of the existing public road network as well as private roads may have to be modified to avoid proposed carbonate plant habitat. The costs associated with such modifications, if any, are discussed further below.

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[28] Personal communication with Section 7 Coordinator, U.S. Fish & Wildlife Service, July 15, 2002.
[30] Personal communication with Range Management Specialist, Bureau of Land Management, April 15, 2002.

FEDERAL ROADS AND TRAILS

Prior to the proposed critical habitat designation, the SBNF had already adopted management direction to avoid effects to occupied carbonate plant habitat as part of new road and trail construction. This policy decision was made in conjunction with a consultation initiated as part the Forest Service Land and Resource Management Plan. The economic impact of a critical habitat designation does not include the costs associated with consultations or project modifications completed prior to a proposed designation. The management direction represents a pre-existing Forest Service policy attributable entirely to the listing of the species. Consequently, the only economic costs attributable to the proposed critical habitat designation would be those associated with reinitiation of the original consultation, as discussed later in this chapter.

While current information and SBNF policies suggest that no new roads or trails are expected to be built within carbonate plant critical habitat, the possibility exists that limited new construction might occur in the next twenty years for a currently unforeseen reason. Although no section 7 consultations for road and trail construction have occurred since 1994 when the carbonate plants were Federally listed, to be conservative, this analysis assumes an average consultation rate of one every ten years for road and trail projects. Thus, to ensure that this analysis is more likely to overestimate than underestimate actual costs, it is assumed that two consultations associated with new road or trail construction within or near the critical habitat area will be required in the next twenty years. These could occur in any of the three critical habitat units. As shown in **Appendix Table B-4**, the total estimated cost ranges from $22,000 to $36,400. These costs are considered to be attributable co-extensively to the listing because (1) SBNF road construction typically impacts large geographic areas and are thus expected to include occupied carbonate plant habitat, and (2) the SBNF is already aware of the presence of the species due to their Federal listing and their status as Forest Service special-status species. BLM personnel have indicated that no road construction activities are anticipated within or adjacent to the proposed critical habitat area in the foreseeable future.[31]

PUBLIC ROADS

There are no proposed expansions or improvements to the public road network that intersect the proposed critical habitat area. In addition, no such proposals are expected in the future, because the critical habitat areas are not located in areas that would otherwise serve as the most direct route between frequently used public destinations. Consequently, no economic costs are attributed to consultations or project modifications associated with public road construction.

[31] Personal communication with Mineral Examiner, Bureau of Land Management, May 15, 2002.

PRIVATE ROADS

It is unlikely that the development of a private road on private land within the proposed carbonate plant critical habitat area would constitute a Federal nexus. However, it is possible that construction of a private road may trigger section 7 nexus if a Federal permit is required (such as a 404 permit if a jurisdictional wetland is present), or if the proposed road intersects Federal land. Although there are no known proposals for private road construction, there are a number of private landowners who essentially hold "islands" of private property within the SBNF (such as patented mining claims surrounded by SBNF land). In order to gain vehicular access to such parcels from the existing SBNF road network, these landowners may be required to secure easements across the Federal land in order to construct the necessary access roads. If such an access road traversed occupied habitat or designated critical habitat, the SBNF would be required to initiate section 7 consultation before issuing such an easement.

This analysis conservatively assumes that over the next 20 years the SBNF will initiate five "technical assistance" calls to the Service regarding proposed private road construction to seek clarification regarding the likelihood of impact to the species and critical habitat. This analysis assumes that four of those calls will not require additional consultation, and that one will result in formal section 7 consultation. This is believed to be a conservative estimate because no historical consultations have occurred regarding private road construction in the past and because access roads to private parcels are likely to already to exist.

As shown in **Appendix Table B-4**, the cost associate with the five technical assistance calls and the one formal consultation is estimated to range from $14,200 to $27,600 over the next 20 years, and includes all costs borne by the Service, the action agency, and private parties. These costs are considered attributed co-extensively to the listing because (1) access roads generally traverse linear geographic areas and would thus be expected to impact occupied habitat areas, and (2) the SBNF and BLM (the "action agencies") are already aware of the presence of the species. The potential economic cost associated with the designations' effect on the development of mining haul roads is included in the economic analysis associated with that activity, as calculated in **Chapter III**.

ACTIVITIES ON PRIVATE LAND

Activities on private land generally do not constitute a Federal nexus unless some type of Federal permit is required. After consulting with the Service, SBNF, BLM, and San Bernardino County, only three "reasonably foreseeable" activities on private land that could potentially constitute a Federal nexus were envisioned: (1) mining operations on patented mining claims when a Section 404 permit from the U.S. Army Corps of Engineers [the Corps]) is required; (2) the potential need for a Section 404 permit for residential development proposed in "waters of the United States," as defined in the Clean Water Act; and (3) the potential need for a SUP from the SBNF for private horseback riding tours originating on private land and traversing Federal land. The potential economic impacts of section 7 related to mining are discussed in detail in Chapter III, and include potential impacts on private land when a Federal nexus exists (in calculating economic impacts, the analysis makes no differentiation regarding land ownership).

It is worth noting again, however, that section 7 would not affect mining on patented mining claims unless a Federal permit of some kind is required, which is normally not the case. Section 7 regulatory requirements and associated costs with respect to SUPs in the SBNF are addressed earlier in this chapter.

According to Section 404 of the Clean Water Act, a permit is required from the Corps if a proposed project has the potential to discharge dredged or fill material into navigable waters of the United States. As a matter of practice, this usually includes filling any drainage channel, basin, or "jurisdictional wetland" in the course of residential or other development. Personnel from the San Bernardino Planning Department indicate that any project under their jurisdiction with the potential to alter a drainage channel or basin would be subject to a drainage review by the Land Development Department. It is the policy of the Planning Department to request an applicant to modify development plans to avoid drainage areas, and not to approve any project that has the potential to alter any drainage channel or basin. For this reason, a Section 404 permit is almost never required for residential construction in San Bernardino County. Indeed, the only instance in which a 404 has ever been required was when an individual altered a drainage basin without first securing County approval, and a 404 permit was required after the fact in order to restore the drainage channel to its original condition. This analysis concludes, therefore, that residential development on private land in the critical habitat area is not likely to constitute a Federal nexus with respect to section 7.[32]

REINITIATION OF SECTION 7 CONSULTATIONS

The SBNF has been involved in the following five formal consultations with the Service, each of which is expected to require re-initiation following the designation of critical habitat.[33] They include the following:

- Intra-Service Section 7 Consultation on the Proposed Issuance of an Incidental Take Permit for Desert Tortoises at the Cushenbury Sand and Gravel Site by Channel and Basin Reclamation, Inc., San Bernardino County, California (PRT-795218)(1-8-95-FW-27), December 6 , 2001;

- Biological and Conference Opinions on the Continued Implementation of Land and Resource Management Plans for the Four Southern California National Forests, February 27, 2001;

- Formal Section 7 Consultation on Various Ongoing and Related Activities Affecting Carbonate Habitats, San Bernardino County, February 5, 2001;

- Biological/Conference Opinion on the Wild Burro Management Plan for the San Bernardino National Forest, January 7, 1997;

[32] Personal communication with Planning Superintendent and Building Inspector, San Bernardino County Planning Department, on July 15, 2002.
[33] Personal communication with Mountaintop District Botanist, San Bernardino National Forest, on March 20, 2002.

- Biological Opinion on Bear Mountain Ski Resort Expansion Project, Big Bear Ranger District, San Bernardino National Forest, January 26, 1995;

The Service and the SBNF have indicated that the reinitiation process is primarily administrative in nature, and is not expected to result in any changes to the conclusions of the original consultations. None of the original consultations resulted in a jeopardy opinion. The second and third consultations listed above involve all three critical habitat units; the first and fourth consultations involve only Unit 1; the fifth consultation involves only Unit 3. The total estimated cost of the four reinitiated consultations ranges from $11,500 to $35,000, which is due solely to the designation of critical habitat.

STIGMA EFFECTS

Stigma impacts can derive from uncertainty concerning the scope and impact of critical habitat designation. Stigma associated with the proposed designation may reduce aggregate willingness-to-pay for the land, which, in turn, results in a reduced land value. By definition, stigma effects are associated with *perceived* regulatory or land-value effects as opposed to *actual* regulatory or land-value effects. As such, Federal lands are less likely to be subject to stigma effects than private land. When present, the impacts on private land are generally difficult to quantify. Stigma effects are solely attributable to critical habitat designation.

The vast majority, approximately 86 percent, of proposed critical habitat designation is on Federal land. While Federal land is generally not subject to stigma effects, a portion of this land contains individually held mining claims. While not titles of ownership, mining claims on Federal land may be bought, sold, leased, and traded, and are therefore subject to stigma effects. In particular, some individuals or associations that hold mining claims on Federal land with the intent to sell or lease those claims at some point in the future may experience reduced values due to uncertainty over how the designation will affect the ability to mine those claims. Furthermore, private lands, primarily patented mining claims, could also experience decreased claim values due to stigma effects.

The scenario most likely to occur with respect to Federal land involves the 150 acres within the proposed critical habitat area that are likely to be mined in the future. Statements made by several mining representatives suggest a perception that no future mining will be "allowed" within the critical habitat boundaries. Thus, there exists the possibility that the future value of these claims may decrease due to the perception that mining will be prohibited. Similarly, the

future value of approximately 1,900 acres of private land could potentially decrease due to the perceived regulatory effect of the designation. These costs are difficult to quantify, however. In addition, they are expected to be short-term given the highly informed nature of the four mining operators active in the Big Bear area as well as the on-going CHMS process. The effect on private land may be further diminished because a significant portion of this land has already been mined.

V. SMALL BUSINESS REGULATORY ENFORCEMENT ACT

Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).[34] However, no regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.[35] SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. Accordingly, the following represents a screening level analysis of the potential effects of critical habitat designation on small entities to assist the Secretary in making this certification.

This analysis determines whether critical habitat potentially affects a "substantial number" of small entities in San Bernardino County. It also qualifies the probable number of small businesses experiencing a "significant effect." While SBREFA does not explicitly define "substantial number" or "significant effect," the Small Business Administration (SBA) and other Federal agencies have interpreted these terms to represent an impact on 20 percent or more of the small entities in any industry and an effect equal to three percent or more of a business' annual sales.[36] Small entities include small businesses as defined by the SBA by employee number or annual receipts, small organizations that are independently owned and operated and are not dominant in their field, and small governments with a population of fewer than 50,000.

As discussed in **Chapters 3 and 4**, activities potentially affected by the proposed designation include mining activities, fire management, recreational SUPs, grazing, road and trail construction, and reinitiated section 7 consultations.[37] As previously discussed, fire management activities, recreational SUPs, road and trail construction, and reinitiated section 7 consultations primarily involve Federal agencies, which do not qualify as small business entities and are therefore not included in this screening analysis.[38]

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[34] 5 U.S.C. 601 et. seq.

[35] Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for "significant impact" **and** a threshold for a "substantial number of small entities." See 5 U.S.C. 605 (b).

[36] See U.S. Small Business Administration, The Regulatory Flexibility Act: An Implementation Guide for Federal Agencies, 1998. Accessed at www.sba.gov/advo/laws/rfaguide.pdf on April 5, 2002.

[37] As discussed in Chapter 4, there are other activities, such as residential construction on private land, that this analysis concluded would not have any impacts associated with section 7. Such activities are therefore not included in this screening level SBREFA analysis.

[38] As discussed in Chapter 4, individual SUP applications will be approved via a streamlined informal section 7 consultation process, whereby letters will be exchanged between the SBNF and the Service to certify that individual applications are compliant with agreements reached during the programmatic section 7 consultation. According to the Service, these letters of concurrence will not involve third party applicants, so no

Therefore, potential small business entities that could be affected by this rulemaking are limited to mining companies, private landowners, and individuals holding mining claims (claimants) within the proposed critical habitat area as well as one individual holding a grazing allotment in the proposed critical habitat area. The three primary mining companies that would be potentially affected by the proposed designation, Omya, SMI, and Mitsubishi Cement Corporation, are all large corporations with more than 500 employees each, and therefore do not qualify as small entities.[39] The single individual who holds a grazing allotment on BLM land is considered a small business entity for the purpose of this screening analysis.

NUMBER OF SMALL BUSINESSES AFFECTED

The largest number of small entities potentially affected by the proposed designation consists of individual mining claimants.[40] To be conservative (i.e., more likely to overstate impacts than understate them), this analysis assumes that all individual claimants meet the definition of business entities.[41] This analysis also limits the potential universe of affected entities to include businesses in San Bernardino County only; this interpretation produces far more conservative results than including all entities nationwide.

Using GIS data layers, this analysis identified 291 mining claims overlapping the proposed critical habitat designation, which are held by 46 claimants (many claimants hold multiple mining claims). Of these claimants, at least three are not considered small entities (Omya, Mistubishi, and SMI), as discussed above. It is conservatively assumed that the remaining 43 claimants are all small entities. This estimate is considered to be especially conservative because it assumes that none of the claims owned by these claimants would be mined due to section 7, and that none has already been mined. In reality, it is likely that some never would have been mined due to economic and/or geologic factors

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potential small entities would be affected.

[39] Defined as businesses in SIC code 1499, and small businesses with fewer than 500 employees. See U.S. Small Business Administration, Table of Size Standards. Accessed at: http://www.sba.gov/size/indextableofsize.html on April 5, 2002.

[40]The SBREFA screening analysis component of previous economic analyses of critical habitat designations have traditionally used the number of predicted section 7 consultations as an indicator of the number of small entities potentially affected by the proposed designation. The majority of section 7 consultations identified in this economic analysis, however, involve either Federal agencies only (the Service, BLM, or SBNF, for example) or one of the three large mining companies described above, and are generally not expected to include third party applicants. Because none of these entities constitutes a small business entity under SBA guidelines, using the estimated number of section 7 consultations as a proxy for the number of affected entities is an inaccurate method in this case.

[41] Following consultation with personnel from both the SBA and the BLM, it remains unclear whether private individuals holding mining claims meet the definition of small business entities under SBA guidelines. Individual claimants are effectively equivalent to land speculators in that they maintain active mining claims with the hope that a mining company will purchase or lease the claim in the future based on the perceived value of the mineral reserves contained beneath it. Although these claimants generally do not hold business licenses, they may be considered "sole proprietors" that qualify as business entities under SBA guidelines.

independent of section 7, and that some of the claims have already been mined, or at least partially mined. Conversely, it is also likely that a number of these claims will still be mined in the future following the designation of critical habitat, as discussed in Chapter 3.

According to BLM personnel, there are 954 claimants in San Bernardino County, although no information was available regarding the name or size of the individual entities. Assuming the same proportion of large entities to total claimants within the proposed critical habitat area (6.5 percent), this analysis assumes that 892 of the claimants in the County are small entities. This represents a very conservative assumption because it is unlikely that many claimants in the County other than Omya, Mistubishi, and SMI have greater than 500 employees, and should be excluded as large entities.[42] Dividing the number of "small" claimants potentially affected by the designation (43) by the number of "small" claimants in the County (892) shows that approximately 4.8 percent of small claimants are potentially affected by the designation, which falls below the 20 percent "substantial" number threshold.

Finally, as discussed in Chapter 4, one individual holding a grazing allotment on BLM land that has been proposed for critical habitat designation could be affected. According to Dun and Bradstreet, there are 159 establishments engaged in beef cattle ranching or farming (NAICS Code 112111) in San Bernardino County.[43] Therefore, the potentially affected individual does not represent a "substantial" number of affected small entities.

These calculations reflect a number of conservative assumptions and still yield results that are below the 20 percent threshold that would be considered "substantial." As a result, this analysis concludes that a significant economic impact on a substantial number of small entities will not result from the designation of critical habitat for the carbonate plants. Nevertheless, an estimate of the number of small businesses that will experience effects at a significant level is provided below.

SIGNIFICANCE OF EFFECTS ON SMALL BUSINESSES

Costs of critical habitat designation to small businesses typically consist of the cost of participating in section 7 consultations and the cost of project modifications, which are calculated in Chapters 3 and Chapter 4. Accordingly, this section reviews the consultation and project modification costs of mining claimants and the grazing allotment. The consultation and project modification costs incurred by Omya, Mitsubishi, and SMI are not germane to this analysis, because they are not considered small entities as discussed above.

[42] The "substantial" number estimate is calculated by dividing the number of small claimants potentially affected by the total number of small claimants in the County. Underestimating the denominator, by excluding more "large entities" than are likely present, produces a more conservative estimate of the percent of small entities affected.
[43] Dun and Bradstreet's "Dun's Market Identifiers" database queried on June 27, 2002.

The estimated one-time cost of the reinitiated section 7 associated with the grazing allotment that is borne by the "third party" applicant (the individual holding the grazing allotment) is between $1,200 and $3,900 (Appendix Table B-4). Based on this cost, the calculated annual revenue "threshold" for this third party applicant is between $40,000 and $130,000 per year.[44] No information was available regarding the applicant's actual annual income, although this analysis conservatively assumes that the one-time section 7 consultation costs are greater than 3 percent of the applicant's annual income, and thus constitute a "significant" effect on this individual during the year in which the consultation occurs only. As noted above, this individual does not represent a "substantial" number of the entities in San Bernardino County that are included in the same NAICS code.

Evaluating the significance of the potential economic impact of the designation on small mining claimants presents unique challenges, and an accurate estimate is difficult to achieve given the scope of this screening level analysis. As noted above, these individuals maintain active mining claims in anticipation that one day the claim will prove valuable if a mining company decides to purchase or lease it to extract the minerals beneath it. The vast majority of the claimants that could potentially be affected by the proposed designation -- those who do not hold claims for currently active or approved mining areas -- do not currently receive any income from their claims. In this sense, it is impossible to quantify the extent to which the likely economic impact can be considered "significant."

As mentioned above, claimants could fall into three theoretical "effect categories" based on the location and geologic quality of their claim: (1) those who will not be affected because their claims would not have been leased anyway; (2) those who would not be affected because they will still be able to lease their claim in the future; and (3) those who will be affected because they would have been able to lease their claim but now can not due to section 7. Unfortunately, no information is available to determine which claims, and how many, fall into each of the above categories. In general, it is difficult to determine whether any specific claim will prove to be valuable in the future (and in the next 20 years, in particular), and how valuable it might prove to be, given the uncertainty and proprietary nature of such information. To the extent such estimates could even be obtained from either the claimants or the mining companies (the potential lessees), they would be inherently unreliable due to inaccuracies associated with self-reporting.

While an accurate estimate of the potential economic impact is difficult to generate, it should be recognized that some number of small claimants could be significantly impacted by section 7. In particular, it is likely that some number of claimants hold claims that would have been mined, but that would no longer be mined following the proposed designation. For these individuals, the likely economic impact may approach 100 percent of their potential annual revenue associated with the claim if the claim is never leased.

[44] A "significant" effect is defined as one that is greater than 3 percent of an affected entity's gross annual revenue. Dividing the estimated consultation cost by 3 percent yields a "threshold" annual revenue estimate that is used to evaluate the significance of the potential impact.

Finally, it should be noted that, if adopted, the CHMS may significantly change the estimated number of claimants potentially affected by section 7 and the qualitative cost estimate presented in this analysis. Any economic impacts incurred by individuals who hold claims that are designated off-limits for future mining by the CHMS would be attributable in part to the CHMS and not entirely to section 7.

VI. BENEFITS OF CRITICAL HABITAT DESIGNATION

There is little disagreement in the published economics literature that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop (1978, 1980), Brookshire and Eubanks (1983), Boyle and Bishop (1986), Hageman (1985), Samples *et al*. (1986), Stoll and Johnson (1984). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran (1994) and Fausold and Lilieholm (1999) both of which are associated with species conservation. Likewise, a regional economy can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

It is not feasible, however, to fully describe and accurately quantify these benefits in the specific context of this economic analysis. For example, most of the studies in the economics literature do not allow for the separation of the benefits of listing (including the Act's take provisions) from the benefits of critical habitat designation. The discussion presented in this report provides examples of potential benefits, which derive primarily from the listing of the species, based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act in general or critical habitat designation in particular. In short, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.

Nevertheless, this report includes a qualitative review of those categories of benefit that are likely to be enhanced as a result of the listing of the species and the proposed critical habitat designation.

The primary goal of listing a species under the Act is to preserve the species and the ecosystems upon which they depend. However, various economic benefits, measured in terms of regional economic performance and enhanced national social welfare, result from species conservation efforts as well. Regional economic benefits can be expressed in terms of jobs created, regional sector revenues, and overall economic activity. National social welfare values reflect both use and non-use (i.e., existence) values, and can reflect various categories of value. For example, use values might include the recreational use of habitat area preserved as a result of the carbonate plants. Existence values are not derived from direct use of the species, but instead reflect the satisfaction and utility people derive from the knowledge that a species exists. In addition, actions to protect the carbonate plants may also benefit other organisms.

The benefits identified above arise primarily from the protection afforded to the carbonate plants under the Federal listing. Critical habitat designation may provide some additional benefits beyond the listing benefits. Critical habitat designation provides some educational benefit by increasing awareness of the extent of carbonate plant habitat. Critical habitat also provides a legal definition of the extent of carbonate plant habitat, which reduces the amount of uncertainty Federal agencies face when determining

if a section 7 consultation is necessary for an activity with a Federal nexus. Similarly, critical habitat designation is expected to result in a programmatic section 7 consultation regarding recreational SUPs, which would streamline the permit process for future applicants and reduce the regulatory burden on SBNF personnel, resulting in some degree of cost savings.

As discussed above, the quantification of total economic benefits attributable to the designation of critical habitat is, at best, difficult. To the extent that future consultations are expected to be associated with the listing of the species, rather than the critical habitat designation, designation of critical habitat does not increase the probability of recovery for the species. In that case, the additional benefits of designating critical habitat for the carbonate plants would be limited to the educational benefits, increased support for existing conservation efforts, and reduced uncertainty regarding the extent of carbonate plant habitat.

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APPENDIX A

Table A-1
Time-series Calculations for Mining Activity Project Modifications
Economic Analysis of Carbonate Plant Critical Habitat Designation

Project Modification	Year								
	0	1	2	3	4	5	6	7	8
Five-Year Dust Management Plan									
Consultation 1	--	$15,000	$5,000	$5,000	$5,000	$5,000	--	--	--
Consultation 2	--	--	--	--	--	$15,000	$5,000	$5,000	5000
Consultation 3	--	--	--	--	--	--	--	--	--
Consultation 4	--	--	--	--	--	--	--	--	--
Consultation 5	--	--	--	--	--	--	--	--	--
Total:	$0	$15,000	$5,000	$5,000	$5,000	$20,000	$5,000	$5,000	$5,000
Net Present Value (7%): $82,878									
Ten-Year Dust Management Plan									
Consultation 1	--	$15,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Consultation 2	--	--	--	--	--	$15,000	$5,000	$5,000	$5,000
Consultation 3	--	--	--	--	--	--	--	--	--
Consultation 4	--	--	--	--	--	--	--	--	--
Consultation 5	--	--	--	--	--	--	--	--	--
Total:	$0	$15,000	$5,000	$5,000	$5,000	$20,000	$10,000	$10,000	$10,000
Net Present Value (7%): $123,466									

Table A-1
Time-series Calculations for Mining Activity Project Modifications
Economic Analysis of Carbonate Plant Critical Habitat Designation

Project Modification	Year								
	9	10	11	12	13	14	15	16	17
Five-Year Dust Management Plan									
Consultation 1	--	--	--	--	--	--	--	--	--
Consultation 2	5000	--	--	--	--	--	--	--	--
Consultation 3	--	$15,000	$5,000	$5,000	$5,000	$5,000	--	--	--
Consultation 4	--	--	--	--	--	--	$15,000	$5,000	$5,000
Consultation 5	--	--	--	--	--	--	--	--	--
Total:	$5,000	$15,000	$5,000	$5,000	$5,000	$5,000	$15,000	$5,000	$5,000
Ten-Year Dust Management Plan									
Consultation 1	$5,000	$5,000	--	--	--	--	--	--	--
Consultation 2	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	--	--	--
Consultation 3	--	$15,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Consultation 4	--	--	--	--	--	--	$15,000	$5,000	$5,000
Consultation 5	--	--	--	--	--	--	--	--	--
Total:	$10,000	$25,000	$10,000	$10,000	$10,000	$10,000	$20,000	$10,000	$10,000

Table A-1
Time-series Calculations for Mining Activity Project Modifications
Economic Analysis of Carbonate Plant Critical Habitat Designation

Project Modification	Year								
	18	19	20	21	22	23	24	25	26
Five-Year Dust Management Plan									
Consultation 1	--	--	--	--	--	--	--	--	--
Consultation 2	--	--	--	--	--	--	--	--	--
Consultation 3	--	--	--	--	--	--	--	--	--
Consultation 4	$5,000	$5,000	--	--	--	--	--	--	--
Consultation 5	--	--	$15,000	$5,000	$5,000	$5,000	$5,000	$0	--
Total:	$5,000	$5,000	$15,000	$5,000	$5,000	$5,000	$5,000	$0	$0
Ten-Year Dust Management Plan									
Consultation 1	--	--	--	--	--	--	--	--	--
Consultation 2	--	--	--	--	--	--	--	--	--
Consultation 3	$5,000	$5,000	--	--	--	--	--	--	--
Consultation 4	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	--	--
Consultation 5		--	$15,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Total:	$10,000	$10,000	$20,000	$10,000	$10,000	$10,000	$10,000	$5,000	$5,000

Table A-1
Time-series Calculations for Mining Activity Project Modifications
Economic Analysis of Carbonate Plant Critical Habitat Designation

Project Modification	27	28	29	30
Five-Year Dust Management Plan				
Consultation 1	--	--	--	--
Consultation 2	--	--	--	--
Consultation 3	--	--	--	--
Consultation 4	--	--	--	--
Consultation 5	--	--	--	--
Total:	$0	$0	$0	$0
Ten-Year Dust Management Plan				
Consultation 1	--	--	--	--
Consultation 2	--	--	--	--
Consultation 3	--	--	--	--
Consultation 4	--	--	--	--
Consultation 5	$5,000	$5,000	$5,000	$0
Total:	$5,000	$5,000	$5,000	$0

Table A-2
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 1	2	3	4	5	6
Potential Reduction in Acres Mined (1)	8	16	24	32	41	49
Potential Reduced Gross Mining Revenue (1)	$2,710,332	$5,420,665	$8,130,997	$10,841,329	$13,551,661	$16,261,994
Potential Reduced Employee Compensation (2)						
Total	$638,298	$1,276,595	$1,914,893	$2,553,191	$3,191,489	$3,829,786
Potential Reduced Net Proprietor Income (2)						
Total	$68,004	$136,008	$204,012	$272,015	$340,019	$408,023
Potential Reduced Property Income (2)						
Total	$315,963	$631,926	$947,889	$1,263,852	$1,579,814	$1,895,777
Potential Reduced Indirect Bus. Taxes (2)						
Total	$123,960	$247,921	$371,881	$495,841	$619,802	$743,762
Potential Reduced Value Added (2)						
Total	$1,146,225	$2,292,450	$3,438,675	$4,584,899	$5,731,124	$6,877,349
Potential Reduced Employment (2)		26	39	52	65	77
20-Year Average Annual		142				
Avg. Salary		$49,434				

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 7	8	9	10	11	12
Potential Reduction in Acres Mined (1)						
Total	57	65	73	81	89	97
Potential Reduced Gross Mining Revenue (1)						
Total	$18,972,326	$21,682,658	$24,392,991	$27,103,323	$29,813,655	$32,523,987
Potential Reduced Employee Compensation (2)						
Total	$4,468,084	$5,106,382	$5,744,680	$6,382,977	$7,021,275	$7,659,573
Potential Reduced Net Proprietor Income (2)						
Total	$476,027	$544,031	$612,035	$680,039	$748,042	$816,046
Potential Reduced Property Income (2)						
Total	$2,211,740	$2,527,703	$2,843,666	$3,159,629	$3,475,592	$3,791,555
Potential Reduced Indirect Bus. Taxes (2)						
Total	$867,723	$991,683	$1,115,643	$1,239,604	$1,363,564	$1,487,524
Potential Reduced Value Added (2)						
Total	$8,023,574	$9,169,799	$10,316,024	$11,462,249	$12,608,473	$13,754,698
Potential Reduced Emplo	90	103	116	129	142	155
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 13	14	15	16	17	18
Potential Reduction in Acres Mined (1)						
Total	106	114	122	130	138	146
Potential Reduced Gross Mining Revenue (1)						
Total	$35,234,320	$37,944,652	$40,654,984	$43,365,317	$46,075,649	$48,785,981
Potential Reduced Employee Compensation (2)						
Total	$8,297,871	$8,936,168	$9,574,466	$10,212,764	$10,851,062	$11,489,359
Potential Reduced Net Proprietor Income (2)						
Total	$884,050	$952,054	$1,020,058	$1,088,062	$1,156,066	$1,224,070
Potential Reduced Property Income (2)						
Total	$4,107,518	$4,423,481	$4,739,443	$5,055,406	$5,371,369	$5,687,332
Potential Reduced Indirect Bus. Taxes (2)						
Total	$1,611,485	$1,735,445	$1,859,405	$1,983,366	$2,107,326	$2,231,286
Potential Reduced Value Added (2)						
Total	$14,900,923	$16,047,148	$17,193,373	$18,339,598	$19,485,823	$20,632,047
Potential Reduced Emplo	168	181	194	207	220	232
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 19	20	21	22	23	24
Potential Reduction in Acres Mined (1)						
Total	154	162	162	162	162	162
Potential Reduced Gross Mining Revenue (1)						
Total	$51,496,313	$54,206,646	$54,206,646	$54,206,646	$54,206,646	$54,206,646
Potential Reduced Employee Compensation (2)						
Total	$12,127,657	$12,765,955	$12,765,955	$12,765,955	$12,765,955	$12,765,955
Potential Reduced Net Proprietor Income (2)						
Total	$1,292,073	$1,360,077	$1,360,077	$1,360,077	$1,360,077	$1,360,077
Potential Reduced Property Income (2)						
Total	$6,003,295	$6,319,258	$6,319,258	$6,319,258	$6,319,258	$6,319,258
Potential Reduced Indirect Bus. Taxes (2)						
Total	$2,355,247	$2,479,207	$2,479,207	$2,479,207	$2,479,207	$2,479,207
Potential Reduced Value Added (2)						
Total	$21,778,272	$22,924,497	$22,924,497	$22,924,497	$22,924,497	$22,924,497
Potential Reduced Emplo	245	258	258	258	258	258
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 25	26	27	28	29	30
Potential Reduction in Acres Mined (1)						
Total	162	162	162	162	162	162
Potential Reduced Gross Mining Revenue (1)						
Total	$54,206,646	$54,206,646	$54,206,646	$54,206,646	$54,206,646	$54,206,646
Potential Reduced Employee Compensation (2)						
Total	$12,765,955	$12,765,955	$12,765,955	$12,765,955	$12,765,955	$12,765,955
Potential Reduced Net Proprietor Income (2)						
Total	$1,360,077	$1,360,077	$1,360,077	$1,360,077	$1,360,077	$1,360,077
Potential Reduced Property Income (2)						
Total	$6,319,258	$6,319,258	$6,319,258	$6,319,258	$6,319,258	$6,319,258
Potential Reduced Indirect Bus. Taxes (2)						
Total	$2,479,207	$2,479,207	$2,479,207	$2,479,207	$2,479,207	$2,479,207
Potential Reduced Value Added (2)						
Total	$22,924,497	$22,924,497	$22,924,497	$22,924,497	$22,924,497	$22,924,497
Potential Reduced Emplo	258	258	258	258	258	258
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 31	32	33	34	35	36
Potential Reduction in Acres Mined (1)						
Total	162	162	162	162	162	162
Potential Reduced Gross Mining Revenue (1)						
Total	$54,206,646	$54,206,646	$54,206,646	$54,206,646	$54,206,646	$54,206,646
Potential Reduced Employee Compensation (2)						
Total	$12,765,955	$12,765,955	$12,765,955	$12,765,955	$12,765,955	$12,765,955
Potential Reduced Net Proprietor Income (2)						
Total	$1,360,077	$1,360,077	$1,360,077	$1,360,077	$1,360,077	$1,360,077
Potential Reduced Property Income (2)						
Total	$6,319,258	$6,319,258	$6,319,258	$6,319,258	$6,319,258	$6,319,258
Potential Reduced Indirect Bus. Taxes (2)						
Total	$2,479,207	$2,479,207	$2,479,207	$2,479,207	$2,479,207	$2,479,207
Potential Reduced Value Added (2)						
Total	$22,924,497	$22,924,497	$22,924,497	$22,924,497	$22,924,497	$22,924,497
Potential Reduced Emplo	258	258	258	258	258	258
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 37	38	39	40	41	42
Potential Reduction in Acres Mined (1)						
Total	162	162	162	162	154	146
Potential Reduced Gross Mining Revenue (1)						
Total	$54,206,646	$54,206,646	$54,206,646	$54,206,646	$51,496,313	$48,785,981
Potential Reduced Employee Compensation (2)						
Total	$12,765,955	$12,765,955	$12,765,955	$12,765,955	$12,127,657	$11,489,359
Potential Reduced Net Proprietor Income (2)						
Total	$1,360,077	$1,360,077	$1,360,077	$1,360,077	$1,292,073	$1,224,070
Potential Reduced Property Income (2)						
Total	$6,319,258	$6,319,258	$6,319,258	$6,319,258	$6,003,295	$5,687,332
Potential Reduced Indirect Bus. Taxes (2)						
Total	$2,479,207	$2,479,207	$2,479,207	$2,479,207	$2,355,247	$2,231,286
Potential Reduced Value Added (2)						
Total	$22,924,497	$22,924,497	$22,924,497	$22,924,497	$21,778,272	$20,632,047
Potential Reduced Emplo	258	258	258	258	245	232
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 43	44	45	46	47	48
Potential Reduction in Acres Mined (1)						
Total	138	130	122	114	106	97
Potential Reduced Gross Mining Revenue (1)						
Total	$46,075,649	$43,365,317	$40,654,984	$37,944,652	$35,234,320	$32,523,987
Potential Reduced Employee Compensation (2)						
Total	$10,851,062	$10,212,764	$9,574,466	$8,936,168	$8,297,871	$7,659,573
Potential Reduced Net Proprietor Income (2)						
Total	$1,156,066	$1,088,062	$1,020,058	$952,054	$884,050	$816,046
Potential Reduced Property Income (2)						
Total	$5,371,369	$5,055,406	$4,739,443	$4,423,481	$4,107,518	$3,791,555
Potential Reduced Indirect Bus. Taxes (2)						
Total	$2,107,326	$1,983,366	$1,859,405	$1,735,445	$1,611,485	$1,487,524
Potential Reduced Value Added (2)						
Total	$19,485,823	$18,339,598	$17,193,373	$16,047,148	$14,900,923	$13,754,698
Potential Reduced Emplo	220	207	194	181	168	155
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 49	50	51	52	53	54
Potential Reduction in Acres Mined (1)						
Total	89	81	73	65	57	49
Potential Reduced Gross Mining Revenue (1)						
Total	$29,813,655	$27,103,323	$24,392,991	$21,682,658	$18,972,326	$16,261,994
Potential Reduced Employee Compensation (2)						
Total	$7,021,275	$6,382,977	$5,744,680	$5,106,382	$4,468,084	$3,829,786
Potential Reduced Net Proprietor Income (2)						
Total	$748,042	$680,039	$612,035	$544,031	$476,027	$408,023
Potential Reduced Property Income (2)						
Total	$3,475,592	$3,159,629	$2,843,666	$2,527,703	$2,211,740	$1,895,777
Potential Reduced Indirect Bus. Taxes (2)						
Total	$1,363,564	$1,239,604	$1,115,643	$991,683	$867,723	$743,762
Potential Reduced Value Added (2)						
Total	$12,608,473	$11,462,249	$10,316,024	$9,169,799	$8,023,574	$6,877,349
Potential Reduced Emplo	142	129	116	103	90	77
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-2 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: Low Estimate

Category	Year 55	56	57	58	59	60
Potential Reduction in Acres Mined (1)						
Total	41	32	24	16	8	0
Potential Reduced Gross Mining Revenue (1)						
Total	$13,551,661	$10,841,329	$8,130,997	$5,420,665	$2,710,332	$0
Potential Reduced Employee Compensation (2)						
Total	$3,191,489	$2,553,191	$1,914,893	$1,276,595	$638,298	$0
Potential Reduced Net Proprietor Income (2)						
Total	$340,019	$272,015	$204,012	$136,008	$68,004	$0
Potential Reduced Property Income (2)						
Total	$1,579,814	$1,263,852	$947,889	$631,926	$315,963	$0
Potential Reduced Indirect Bus. Taxes (2)						
Total	$619,802	$495,841	$371,881	$247,921	$123,960	$0
Potential Reduced Value Added (2)						
Total	$5,731,124	$4,584,899	$3,438,675	$2,292,450	$1,146,225	$0
Potential Reduced Emplo	65	52	39	26	13	0
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 162 acres, or 6% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 1	2	3	4	5	6
Potential Reduction in Acres Mined (1)	13	26	39	52	66	79
Potential Reduced Gross Mining Revenue (1)	$4,379,495	$8,758,990	$13,138,485	$17,517,980	$21,897,475	$26,276,970
Potential Reduced Employee Compensation (2)						
Total	$1,031,394	$2,062,789	$3,094,183	$4,125,578	$5,156,972	$6,188,367
Potential Reduced Net Proprietor Income (2)						
Total	$109,884	$219,768	$329,652	$439,537	$549,421	$659,305
Potential Reduced Property Income (2)						
Total	$510,549	$1,021,098	$1,531,648	$2,042,197	$2,552,746	$3,063,295
Potential Reduced Indirect Bus. Taxes (2)						
Total	$200,302	$400,603	$600,905	$801,206	$1,001,508	$1,201,809
Potential Reduced Value Added (2)						
Total	$1,852,129	$3,704,259	$5,556,388	$7,408,517	$9,260,647	$11,112,776
Potential Reduced Employment (2)		42	63	83	104	125
20-Year Average Annual		230				
Avg. Salary		$49,434				

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 7	8	9	10	11	12
Potential Reduction in Acres Mined (1)						
Total	92	105	118	131	144	157
Potential Reduced Gross Mining Revenue (1)						
Total	$30,656,465	$35,035,959	$39,415,454	$43,794,949	$48,174,444	$52,553,939
Potential Reduced Employee Compensation (2)						
Total	$7,219,761	$8,251,156	$9,282,550	$10,313,945	$11,345,339	$12,376,734
Potential Reduced Net Proprietor Income (2)						
Total	$769,189	$879,073	$988,957	$1,098,842	$1,208,726	$1,318,610
Potential Reduced Property Income (2)						
Total	$3,573,844	$4,084,393	$4,594,943	$5,105,492	$5,616,041	$6,126,590
Potential Reduced Indirect Bus. Taxes (2)						
Total	$1,402,111	$1,602,412	$1,802,714	$2,003,016	$2,203,317	$2,403,619
Potential Reduced Value Added (2)						
Total	$12,964,905	$14,817,035	$16,669,164	$18,521,293	$20,373,423	$22,225,552
Potential Reduced Emplo	146	167	188	209	230	250
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 13	14	15	16	17	18
Potential Reduction in Acres Mined (1)						
Total	171	184	197	210	223	236
Potential Reduced Gross Mining Revenue (1)						
Total	$56,933,434	$61,312,929	$65,692,424	$70,071,919	$74,451,414	$78,830,909
Potential Reduced Employee Compensation (2)						
Total	$13,408,128	$14,439,522	$15,470,917	$16,502,311	$17,533,706	$18,565,100
Potential Reduced Net Proprietor Income (2)						
Total	$1,428,494	$1,538,378	$1,648,262	$1,758,146	$1,868,031	$1,977,915
Potential Reduced Property Income (2)						
Total	$6,637,139	$7,147,688	$7,658,238	$8,168,787	$8,679,336	$9,189,885
Potential Reduced Indirect Bus. Taxes (2)						
Total	$2,603,920	$2,804,222	$3,004,523	$3,204,825	$3,405,126	$3,605,428
Potential Reduced Value Added (2)						
Total	$24,077,681	$25,929,811	$27,781,940	$29,634,069	$31,486,199	$33,338,328
Potential Reduced Emplo	271	292	313	334	355	376
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 19	20	21	22	23	24
Potential Reduction in Acres Mined (1)						
Total	249	262	262	262	262	262
Potential Reduced Gross Mining Revenue (1)						
Total	$83,210,404	$87,589,899	$87,589,899	$87,589,899	$87,589,899	$87,589,899
Potential Reduced Employee Compensation (2)						
Total	$19,596,495	$20,627,889	$20,627,889	$20,627,889	$20,627,889	$20,627,889
Potential Reduced Net Proprietor Income (2)						
Total	$2,087,799	$2,197,683	$2,197,683	$2,197,683	$2,197,683	$2,197,683
Potential Reduced Property Income (2)						
Total	$9,700,434	$10,210,983	$10,210,983	$10,210,983	$10,210,983	$10,210,983
Potential Reduced Indirect Bus. Taxes (2)						
Total	$3,805,730	$4,006,031	$4,006,031	$4,006,031	$4,006,031	$4,006,031
Potential Reduced Value Added (2)						
Total	$35,190,458	$37,042,587	$37,042,587	$37,042,587	$37,042,587	$37,042,587
Potential Reduced Emplo	396	417	417	417	417	417
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 25	26	27	28	29	30
Potential Reduction in Acres Mined (1)						
Total	262	262	262	262	262	262
Potential Reduced Gross Mining Revenue (1)						
Total	$87,589,899	$87,589,899	$87,589,899	$87,589,899	$87,589,899	$87,589,899
Potential Reduced Employee Compensation (2)						
Total	$20,627,889	$20,627,889	$20,627,889	$20,627,889	$20,627,889	$20,627,889
Potential Reduced Net Proprietor Income (2)						
Total	$2,197,683	$2,197,683	$2,197,683	$2,197,683	$2,197,683	$2,197,683
Potential Reduced Property Income (2)						
Total	$10,210,983	$10,210,983	$10,210,983	$10,210,983	$10,210,983	$10,210,983
Potential Reduced Indirect Bus. Taxes (2)						
Total	$4,006,031	$4,006,031	$4,006,031	$4,006,031	$4,006,031	$4,006,031
Potential Reduced Value Added (2)						
Total	$37,042,587	$37,042,587	$37,042,587	$37,042,587	$37,042,587	$37,042,587
Potential Reduced Emplo	417	417	417	417	417	417
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 31	32	33	34	35	36
Potential Reduction in Acres Mined (1)						
Total	262	262	262	262	262	262
Potential Reduced Gross Mining Revenue (1)						
Total	$87,589,899	$87,589,899	$87,589,899	$87,589,899	$87,589,899	$87,589,899
Potential Reduced Employee Compensation (2)						
Total	$20,627,889	$20,627,889	$20,627,889	$20,627,889	$20,627,889	$20,627,889
Potential Reduced Net Proprietor Income (2)						
Total	$2,197,683	$2,197,683	$2,197,683	$2,197,683	$2,197,683	$2,197,683
Potential Reduced Property Income (2)						
Total	$10,210,983	$10,210,983	$10,210,983	$10,210,983	$10,210,983	$10,210,983
Potential Reduced Indirect Bus. Taxes (2)						
Total	$4,006,031	$4,006,031	$4,006,031	$4,006,031	$4,006,031	$4,006,031
Potential Reduced Value Added (2)						
Total	$37,042,587	$37,042,587	$37,042,587	$37,042,587	$37,042,587	$37,042,587
Potential Reduced Emplo	417	417	417	417	417	417
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year					
	37	38	39	40	41	42
Potential Reduction in Acres Mined (1)						
Total	262	262	262	262	249	236
Potential Reduced Gross Mining Revenue (1)						
Total	$87,589,899	$87,589,899	$87,589,899	$87,589,899	$83,210,404	$78,830,909
Potential Reduced Employee Compensation (2)						
Total	$20,627,889	$20,627,889	$20,627,889	$20,627,889	$19,596,495	$18,565,100
Potential Reduced Net Proprietor Income (2)						
Total	$2,197,683	$2,197,683	$2,197,683	$2,197,683	$2,087,799	$1,977,915
Potential Reduced Property Income (2)						
Total	$10,210,983	$10,210,983	$10,210,983	$10,210,983	$9,700,434	$9,189,885
Potential Reduced Indirect Bus. Taxes (2)						
Total	$4,006,031	$4,006,031	$4,006,031	$4,006,031	$3,805,730	$3,605,428
Potential Reduced Value Added (2)						
Total	$37,042,587	$37,042,587	$37,042,587	$37,042,587	$35,190,458	$33,338,328
Potential Reduced Emplo	417	417	417	417	396	376
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 43	44	45	46	47	48
Potential Reduction in Acres Mined (1)						
Total	223	210	197	184	171	157
Potential Reduced Gross Mining Revenue (1)						
Total	$74,451,414	$70,071,919	$65,692,424	$61,312,929	$56,933,434	$52,553,939
Potential Reduced Employee Compensation (2)						
Total	$17,533,706	$16,502,311	$15,470,917	$14,439,522	$13,408,128	$12,376,734
Potential Reduced Net Proprietor Income (2)						
Total	$1,868,031	$1,758,146	$1,648,262	$1,538,378	$1,428,494	$1,318,610
Potential Reduced Property Income (2)						
Total	$8,679,336	$8,168,787	$7,658,238	$7,147,688	$6,637,139	$6,126,590
Potential Reduced Indirect Bus. Taxes (2)						
Total	$3,405,126	$3,204,825	$3,004,523	$2,804,222	$2,603,920	$2,403,619
Potential Reduced Value Added (2)						
Total	$31,486,199	$29,634,069	$27,781,940	$25,929,811	$24,077,681	$22,225,552
Potential Reduced Emplo	355	334	313	292	271	250
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 49	50	51	52	53	54
Potential Reduction in Acres Mined (1)						
Total	144	131	118	105	92	79
Potential Reduced Gross Mining Revenue (1)						
Total	$48,174,444	$43,794,949	$39,415,454	$35,035,959	$30,656,465	$26,276,970
Potential Reduced Employee Compensation (2)						
Total	$11,345,339	$10,313,945	$9,282,550	$8,251,156	$7,219,761	$6,188,367
Potential Reduced Net Proprietor Income (2)						
Total	$1,208,726	$1,098,842	$988,957	$879,073	$769,189	$659,305
Potential Reduced Property Income (2)						
Total	$5,616,041	$5,105,492	$4,594,943	$4,084,393	$3,573,844	$3,063,295
Potential Reduced Indirect Bus. Taxes (2)						
Total	$2,203,317	$2,003,016	$1,802,714	$1,602,412	$1,402,111	$1,201,809
Potential Reduced Value Added (2)						
Total	$20,373,423	$18,521,293	$16,669,164	$14,817,035	$12,964,905	$11,112,776
Potential Reduced Emplo	230	209	188	167	146	125
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

Table A-3 -- Continued
Economic Impact Calculation from Potential Reduced Mining in Critical Habitat Area: High Estimate

Category	Year 55	56	57	58	59	60
Potential Reduction in Acres Mined (1)						
Total	66	52	39	26	13	0
Potential Reduced Gross Mining Revenue (1)						
Total	$21,897,475	$17,517,980	$13,138,485	$8,758,990	$4,379,495	$0
Potential Reduced Employee Compensation (2)						
Total	$5,156,972	$4,125,578	$3,094,183	$2,062,789	$1,031,394	$0
Potential Reduced Net Proprietor Income (2)						
Total	$549,421	$439,537	$329,652	$219,768	$109,884	$0
Potential Reduced Property Income (2)						
Total	$2,552,746	$2,042,197	$1,531,648	$1,021,098	$510,549	$0
Potential Reduced Indirect Bus. Taxes (2)						
Total	$1,001,508	$801,206	$600,905	$400,603	$200,302	$0
Potential Reduced Value Added (2)						
Total	$9,260,647	$7,408,517	$5,556,388	$3,704,259	$1,852,129	$0
Potential Reduced Emplo	104	83	63	42	21	0
20-Year Average Annual						
Avg. Salary						

(1) See Table 4 and Table 5 for key assumptions. Total foregone mining of 262 acres, or 10% of potentially minable acres in critical habitat area, are distributed evenly over 20 year time frame.
(2) Based on multipliers derived from Implan 1999 Input/Output model.

APPENDIX B

CONSULTATION COST MODEL

Estimates of the cost of an individual consultation were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures were based on an average level of effort for consultations of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies. Estimates take into consideration the level of effort of the Service, the Action agency, and the applicant during both formal and informal consultations, as well as the varying complexity of consultations. Informal consultations are assumed to involve a low to medium level of complexity. Formal consultations are assumed to involve a medium to high level of complexity. The cost of a formal consultation includes the cost of the informal consultation that likely began the section 7 consultation process.

Section 7 consultation costs include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and in some cases, developing a biological assessment and biological opinion. The costs of reinitiating a consultation are assumed to be similar to conducting the original consultation, because the re-initiation generally involves time spent in meetings and preparing letters. This analysis assumes that the economic impact associated with a non-substantive reinitiation is similar to the cost of an informal consultation and the economic impact associated with a substantive re-initiation is similar to the cost of a formal consultation. The cost of internal consultation, where the Service is the Action agency, depends on the activity under consideration and may be similar to the costs of either informal or formal consultations.

Cost estimates for technical assistance are based on an analysis of past technical assistance efforts by the Service in southern California. Technical assistance costs represent the estimated economic costs of informational conversations, letters, and meetings between landowners or developers and the Service regarding the designation of critical habitat. Most likely, such communication will occur between municipal or private property owners and the Service regarding areas designated as critical habitat or lands adjacent to critical habitat.

Estimated administrative costs associated with section 7 consultations, reinitiations, and technical assistance efforts are presented in Table B-1 (these are per effort estimates). The low and the high scenarios represent a reasonable range of costs for each type of interaction. For example, when the Service participates in technical assistance with a third party regarding a particular activity, the cost of the Service's effort is expected to be approximately $260 to $680. The cost of the third party's effort is expected to be approximately $600 to $1,500. A summary of total costs by agency and consultation type is shown in Table B-2. A description of the number of anticipated consultations by project is shown in Table B-3. Project-level cost summaries by agency and by consultation type are shown in Table B-4 and Table B-5, respectively.

Project modifications may be agreed upon during both informal and formal consultations. The costs of modifications are estimated on a case-specific basis, relying on information provided by the Service, action agencies, and private parties involved in the consultations. Likely project modifications and associated costs are addressed in the main report text, for each relevant activity.

Table B-1
Individual Consultation and Technical Assistance Costs [1]
Economic Analysis of Carbonate Plant Proposed Critical Habitat Designation

Category	Technical Assistance		Informal Consultations		Formal Consultations	
	Low	*High*	*Low*	*High*	*Low*	*High*
USFWS	$260	$680	$1,000	$3,100	$3,100	$6,100
Action Agency	$0	$0	$1,300	$3,900	$3,900	$6,500
Third Party	$600	$1,500	$1,200	$2,900	$2,900	$4,100
Biological Assessment	$0	$0	$0	$4,000	$4,000	$5,600

Notes:
[1] A low to high cost range is specified for each action.

Table B-2
Consultation and Technical Assistance Administrative Cost Summary
Economic Analysis of Carbonate Plant Proposed Critical Habitat Designation

Category	Technical Assistance		Informal Consultation		Formal Consultation [1]		TOTAL	
	Low	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
USFWS	$6,500	$17,000	$26,000	$80,600	$62,000	$122,000	**$94,500**	**$219,600**
Action Agency	$0	$0	$33,800	$101,400	$78,000	$130,000	**$111,800**	**$231,400**
Third Party	$15,000	$37,500	$1,200	$2,900	$31,900	$45,100	**$48,100**	**$85,500**
Biological Assessments	$0	$0	$0	$0	$76,000	$106,400	**$76,000**	**$106,400**
TOTAL	**$21,500**	**$54,500**	**$61,000**	**$184,900**	**$247,900**	**$403,500**	**$330,400**	**$642,900**

Notes:
[1] Formal Consultation cost totals include Biological Assessment costs.

Table B-3
Consultation Descriptions for Future Activities
Economic Analysis of Carbonate Plant Proposed Critical Habitat Designation

Consultation Nexus		**Consultation Descriptions**					
Project Owner/Activity	Action Agency	Technical Assistance	Informal Consultations	Informal 3rd Party	Formal Consultations	Formal 3rd Party [1]	Biological Assessments [2]
Mining Companies							
Omya, Inc.	SBNF	-	-	-	3	3	3
Specialty Minerals, Inc (SMI)	SBNF/BLM	-	-	-	3	3	3
Mitsubishi Cement Corporation	SBNF	-	-	-	2	2	2
Right Star Calcite	SBNF	-	-	-	2	2	2
Individuals holding patented mining claims	SBNF/BLM	20	-	-	-	-	-
Other Land Uses							
Fire Management	SBNF	-	-	-	6	-	6
Recreational Special Use Permits (SUPs) [2]							
Programmatic Consultation	SBNF	-	-	-	1	-	1
Streamlined Informal Consultations	SBNF	-	20	-	-	-	-
Grazing	BLM	-	1	1	-	-	-
Road and trail construction							
Forest Service roads and trails	SBNF	-	-	-	2	-	2
Private road construction	SBNF	5	-	-	1	1	-
Reinitiated section 7 conultations	SBNF	-	5	-	-	-	-
Total		**25**	**26**	**1**	**20**	**11**	**19**

[1] The number reported in this column reflects the total number of third parties participating in formal consultations (for example, if there are three formal consultations and one third party listed, only one consultation includes a third party participant).

Table B-4
Consultation Costs by Agency and Party
Economic Analysis of Carbonate Plant Proposed Critical Habitat Designation

Consultation Nexus		**Consultation Costs**							
Project Owner/Activity	Action Agency	Fish and Wildlife Service		Action Agency		Third Party		**Total**	
		Low	*High*	*Low*	*High*	*Low*	*High*	***Low***	***High***
Mining Companies									
Omya, Inc.	SBNF	$21,300	$35,100	$11,700	$19,500	$8,700	$12,300	**$41,700**	**$66,900**
Specialty Minerals, Inc (SMI)	SBNF/BLM	$21,300	$35,100	$11,700	$19,500	$8,700	$12,300	**$41,700**	**$66,900**
Mitsubishi Cement Corporation	SBNF	$14,200	$23,400	$7,800	$13,000	$5,800	$8,200	**$27,800**	**$44,600**
Right Star Calcite	SBNF	$14,200	$23,400	$7,800	$13,000	$5,800	$8,200	**$27,800**	**$44,600**
Individuals holding patented mining claims	SBNF/BLM	$5,200	$13,600	-	-	$12,000	$30,000	**$17,200**	**$43,600**
Subtotal								**$156,200**	**$266,600**
Other Land Uses									
Fire Management	SBNF	$42,600	$70,200	$23,400	$39,000	-	-	**$66,000**	**$109,200**
Recreational Special Use Permits (SUPs) [2]									
Programmatic Consultation	SBNF	$21,730	$21,730	$21,730	$21,730	-	-	**$43,460**	**$43,460**
Streamlined Informal Consultations	SBNF	$20,000	$62,000	$26,000	$78,000	-	-	**$46,000**	**$140,000**
Grazing	BLM	$1,000	$3,100	$1,300	$3,900	$1,200	$3,900	**$3,500**	**$10,900**
Road and trail construction									
Forest Service roads and trails	SBNF	$14,200	$23,400	$7,800	$13,000	-	-	**$22,000**	**$36,400**
Private road construction	SBNF	$4,400	$9,500	$3,900	$6,500	$5,900	$11,600	**$14,200**	**$27,600**
Reinitiated section 7 conultations	SBNF	$5,000	$15,500	$6,500	$19,500	-	-	**$11,500**	**$35,000**
Total		**$185,130**	**$336,030**	**$129,630**	**$246,630**	**$48,100**	**$86,500**	**$519,060**	**$935,760**

Table B-5
Consultation Costs by Consultation Type
Economic Analysis of Carbonate Plant Proposed Critical Habitat Designation

Consultation Nexus		**Consultation Costs**							
Project Owner/Activity	Action Agency	Technical Assistance		Informal Consultations		Formal Consultations		Biological Assessments	
		Low	*High*	*Low*	*High*	*Low*	*High*	*Low*	*High*
Mining Companies									
Omya, Inc.	SBNF	-	-	-	-	$29,700	$50,100	$12,000	$16,800
Specialty Minerals, Inc (SMI)	SBNF/BLM	-	-	-	-	$29,700	$50,100	$12,000	$16,800
Mitsubishi Cement Corporation	SBNF	-	-	-	-	$19,800	$33,400	$8,000	$11,200
Right Star Calcite	SBNF	-	-	-	-	$19,800	$33,400	$8,000	$11,200
Individuals holding patented mining claims	SBNF/BLM	$17,200	$43,600	-	-	-	-	-	-
Other Land Uses									
Fire Management	SBNF	-	-	-	-	$42,000	$75,600	$24,000	$33,600
Recreational Special Use Permits (SUPs) [1]									
Programmatic Consultation	SBNF	-	-	-	-	$39,460	$37,860	$4,000	$5,600
Streamlined Informal Consultations	SBNF	-	-	$46,000	$140,000	-	-	-	-
Grazing	BLM	-	-	$3,500	$9,900	-	-	-	-
Road and trail construction									
Forest Service roads and trails	SBNF	-	-	-	-	$14,000	$25,200	$8,000	$11,200
Private road construction	SBNF	$4,300	$10,900	-	-	$9,900	$16,700	-	-
Reinitiated section 7 conultations	SBNF	-	-	$11,500	$35,000	-	-	-	-
Total		**$21,500**	**$54,500**	**$61,000**	**$184,900**	**$204,360**	**$322,360**	**$76,000**	**$106,400**

[1] The unit cost estimate for this single programmatic consultation was supplied by SBNF personnel, which was then applied to both the Action Agency (SBNF) and the U.S. Fish and Wildlife Service.